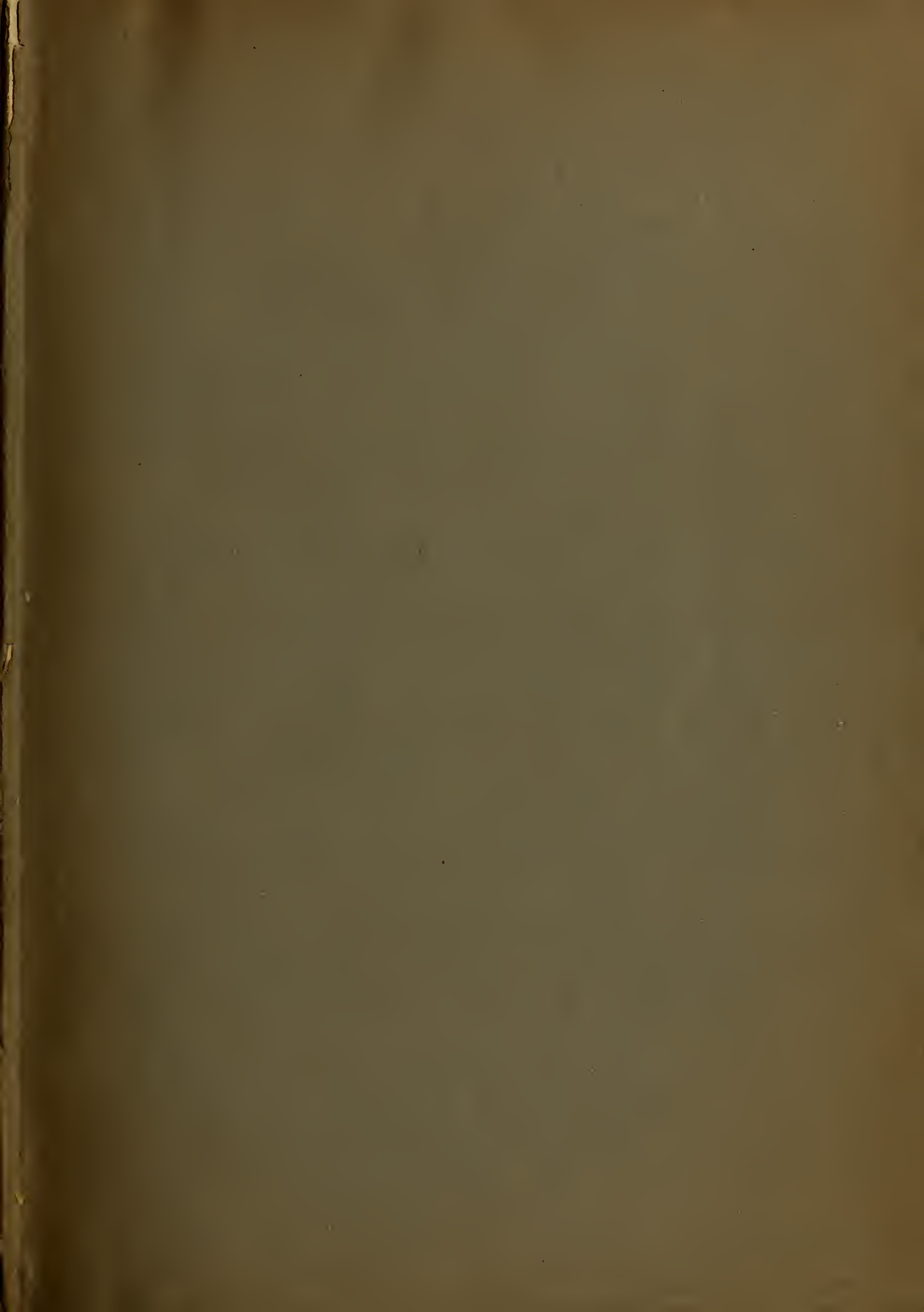
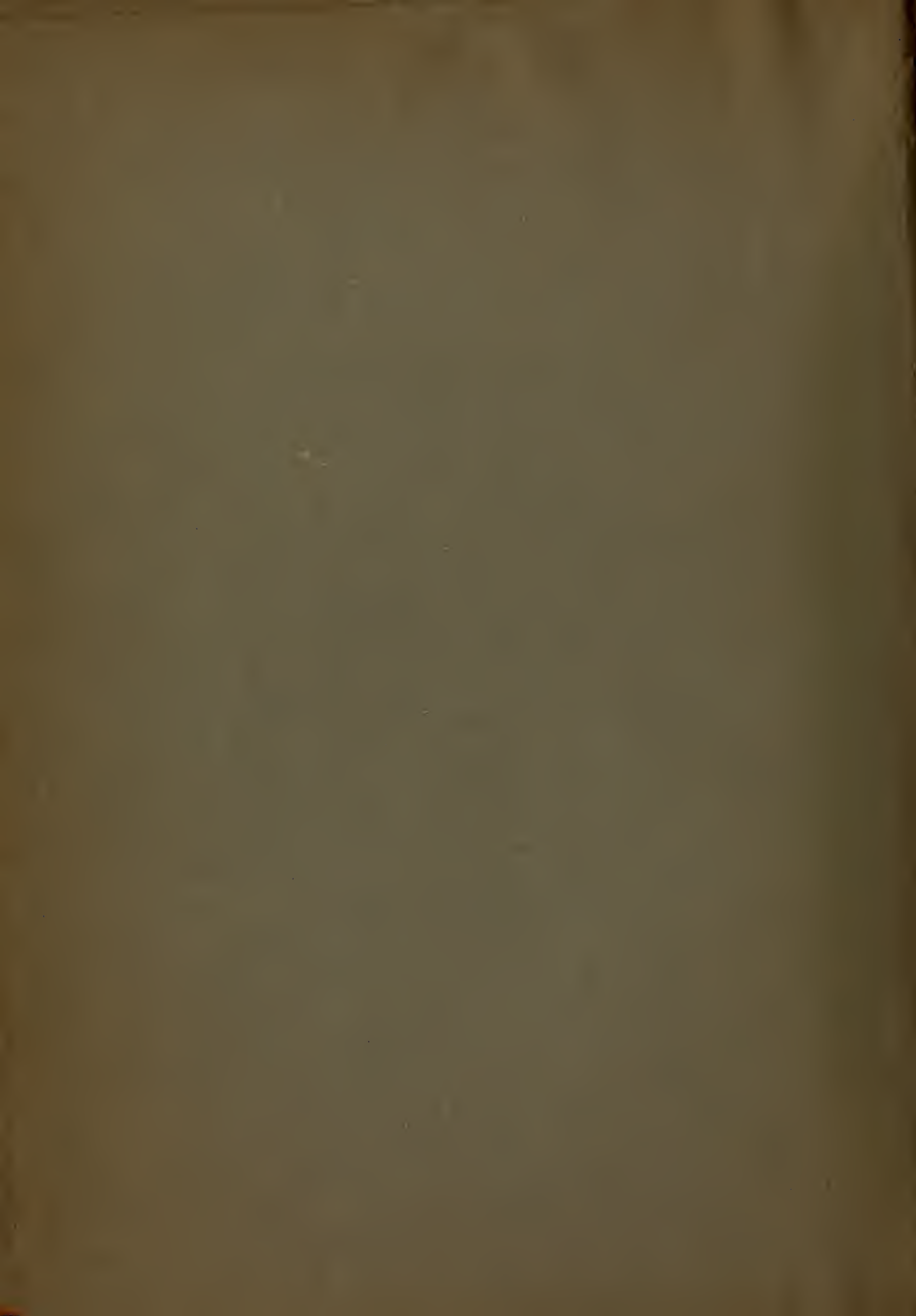
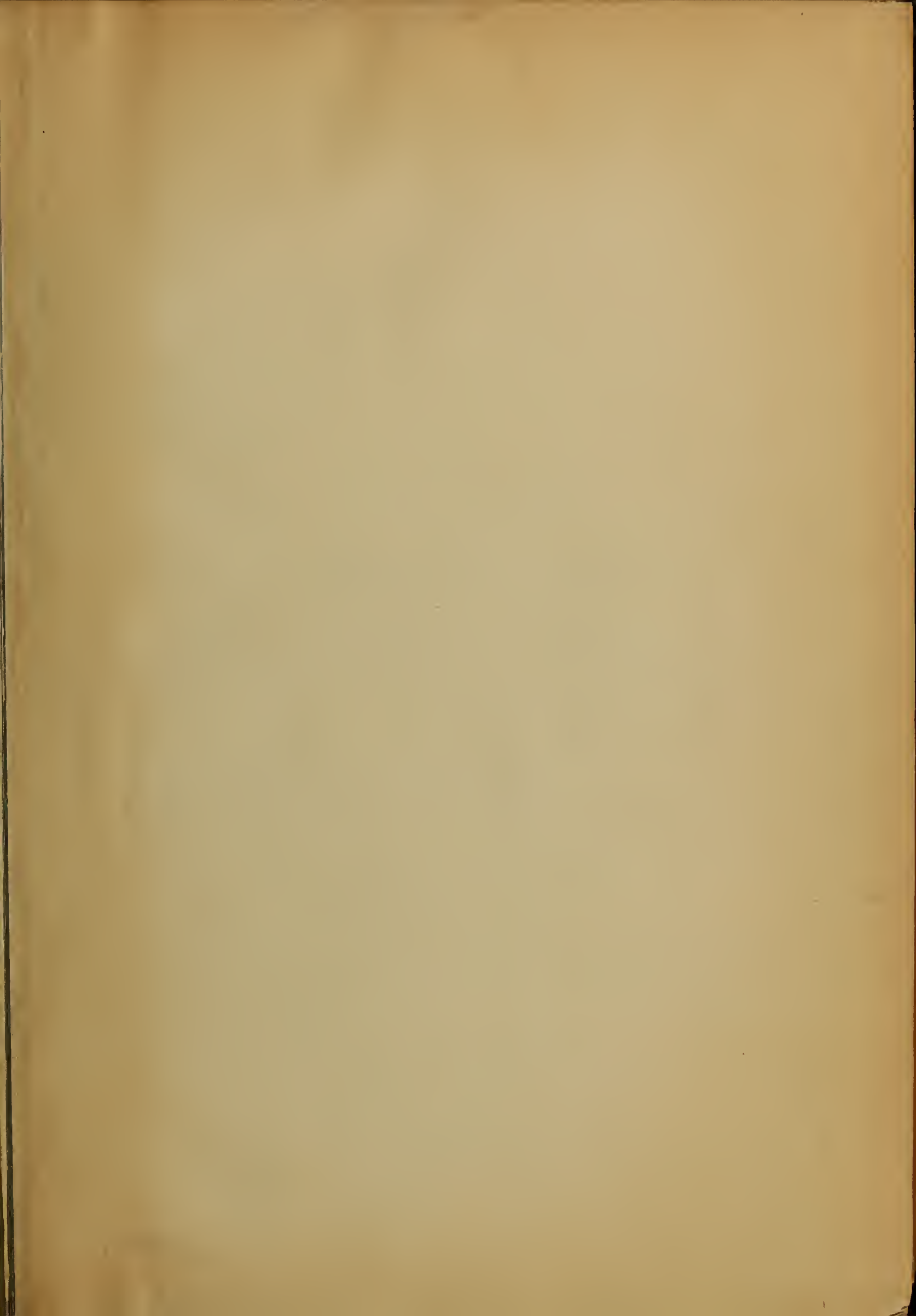


PROPERTY OF
HARRIS, CUNNINGHAM, LEWIS & MESSIE,
700 Tenth Street, N. W.,
WASHINGTON, D. C.







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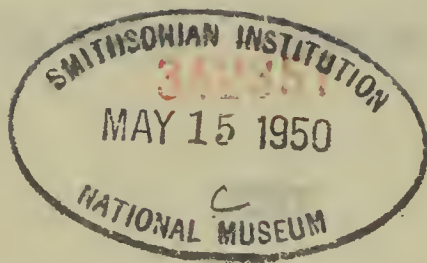
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NUMERICAL LIST
OF
PATENTS.

H. S. Paten F. H.

GRAPHOPHONE PATENTS - VOLUME XVI.

1916.



(NUMERICAL LIST)

VOL. XVI.

GRAPHOPHONE PATENTS.

No. 1,166,602 - to - No. 1,189,152.

January - June, 1916.

-
- 1,166,602, Jan. 4, Keszthelyi et al., Sound Box;
1,166,627, Jan. 4, Ostrom, Sound Box;
1,166,851, Jan. 4, Morris, Stop for Talking Machines;
1,166,925, Jan. 4, Ober, Apparatus for Recording and Reproducing Sound;
1,166,953, Jan. 4, Waller, Phonograph Sound Box;
1,167,063, Jan. 4, Haag, Phonographic Disk Record Cabinet;
1,167,206, Jan. 4, Ogden, Cabinet for Sound Records;
1,167,304, Jan. 4, Johnson, Automatic Lighting Attachment for Phonograph Cabinets;
1,167,468, Jan. 11, Aylsworth, Molded Article;
1,167,489, Jan. 11, Gall, Phonograph Reproducer;
1,167,500, Jan. 11, Holland, Phonograph;
1,167,501, Jan. 11, Holland, Phonographic Apparatus;
1,167,796, Jan. 11, Cirelli, Talking Machine;
1,167,838, Jan. 11, Prout, Sound Reproducing Machine;
1,167,842, Jan. 11, Rotter et al., Phonograph Mechanism;
1,167,972, Jan. 11, Brightson, Tone Moderator for Talking Machines;
1,168,053, Jan. 11, Boyden, Vehicle Signaling System;
1,168,239, Jan. 11, Babson et al., Talking Machine;
1,168,412, Jan. 18, Oliver, Adapted Stylus for Phonographs;
1,168,606, Jan. 18, Daily, Talking Machine;
1,168,910, Jan. 18, Rostron, Sound Record Cleaner;
1,168,432, Jan. 18, Seelau, Telegraphophone;
1,169,134, Jan. 25, Dennison, Sound Box for Talking Machines;
1,169,317, Jan. 25, Catucci, Record Meter for Talking Machines;
1,169,861, Feb. 1, Oliver, Adapter Stylus for Phonographs;
1,170,134, Feb. 1, Allis et al., Phonograph;
1,170,258, Feb. 1, Holden, Phonograph or Talking Machine;
1,170,325, Feb. 1, Poposkey, Attachment for Musical Instruments;

mus. (S. & P. Pub. Co. 1914-18) Nat. Law. Book Co. 12 May 1917

- 1,170,391, Feb. 1, Aylsworth et al., Process of Forming Sound-Records and Other Objects;
1,170,427, Feb. 1, D'Oench, Figure Toy Attachment for Disk Phonographs;
1,170,447, Feb. 1, Hughes, Record Holder;
1,170,530, Feb. 8, Gruenfeldt, Method of Regulating Sound Box Reproduction;
1,170,675, Feb. 8, Royal, Spring Barrel for Talking Machine Motors;
1,170,800, Feb. 8, Cheney, Sound Resonator and Amplifier;
1,170,801, Feb. 8, Cheney, Sound Reproducing Machine;
1,170,802, Feb. 8, Cheney, Sound Reproducing Machine;
1,170,803, Feb. 8, Cheney, Sound Reproducing Apparatus;
1,170,997, Feb. 8, Scalbom, Stop Mechanism for Graphophones;
1,171,082, Feb. 8, Baer, Sound Recording and Reproducing Machine;
1,171,118, Feb. 8, Harris, Holder for Records and the Like;
1,172,304, Feb. 22, Norman, Means for Automatically Stopping the Motors of Talking Machines;
1,172,346, Feb. 22, Faldl, Sound Controller for Phonographs;
1,172,370, Feb. 22, Kramm, Jr., Automatic Stop Mechanism for Sound Reproducing Machines;
1,172,380, Feb. 22, Madden, Speed Regulator for Phonographs and the Like;
1,172,533, Feb. 22, Kane, Pitch Ascertaining Attachment for Sound Reproducing Records;
1,172,717, Feb. 22, Laurencich, Graphophone;
1,172,754, Feb. 22, Wilkinson et al., Phonograph Disk Holder;
1,172,838, Feb. 22, Sabine, Device for Preventing the Transmission of Sound;
1,173,104, Feb. 22, English, Talking Machine;
1,173,251, Feb. 29, Chapin, Needle Setter;
1,173,272, Feb. 29, Hollingshead, Resonator for Sound Reproducing Devices;
1,173,316, Feb. 29, Segal, Handle for Winding Phonograph Spring Motors;
1,173,466, Feb. 29, Teske, Winding Index for Indicator Mechanism for Timepieces, Musical and Other Mechanisms;
1,173,501, Feb. 29, Geer, Sound Reproducer;
1,173,758, Feb. 29, Wecerzick, Sound Control for Talking Machines;
1,174,274, Mar. 7, Philpot et al., Apparatus for Manufacturing Phonograph Records;
1,174,292, Mar. 7, Schiffel, Machine for Shaving Sound Records;
1,174,358, Mar. 7, Sexton, Amplifying Device;
1,174,454, Mar. 7, Taliaferro, Winding Device for Spring Motors;

- 1,174,996, Mar. 14, Kulp, Sound Box for Phonographs;
1,175,205, Mar. 14, I.S. & T.B. Turner, Tape Graphophone;
1,175,639, Mar. 14, Keogh, Repeater; (Assigned to the
American Graphophone Co., March 26th, 1916);
1,175,728, Mar. 14, Eichengrun, Gramophone Record;
1,175,765, Mar. 14, Hughes, Brake Mechanism for Talk-
ing Machines;
1,175,912, Mar. 21, Adair, Phonograph Stop;
1,176,326, Mar. 21, Sutlive, Diaphragm for Sound Repro-
ducers;
1,176,919, Mar. 28, Nemeth, Timekeeper Device;
1,177,025, Mar. 28, Ellis, Diaphragm;
1,177,047, Mar. 28, Opel, Machine for Transmitting Sound
Over Long Distances;
1,177,227, Mar. 28, Boerries, Stop Mechanism for Phono-
graphs;
1,177,887, Apr. 4, Newman, Arrangement of the Parts of
a Talking Machine in Particular for Speaking
Dolls;
1,177,978, Apr. 4, Washburn et al., Vocal Automobile
Signal;
1,178,014, Apr. 4, Holland, Phonograph;
1,178,061, Apr. 4, Dyer, Phonograph;
1,178,840, Apr. 11, Cassard, Phonograph;
1,178,871, Apr. 11, Opferkuck et al., Phonograph;
1,179,591, Apr. 18, Whitehead, Means for Operating a
Picture Displaying Apparatus from a Sound
Producing Apparatus;
1,179,660, Apr. 18, Sanders, Manufacturing Sound Re-
cord Tablets;
1,180,008, Apr. 18, Catucci, Sound Box;
1,180,401, Apr. 25, Johnson, Sound Box Diaphragm;
1,181,108, May 2, Capps, Mounting for Record Support-
ing Tablets in Talking Machines;
1,181,146, May 2, Leet, Apparatus for Transmitting
Sound Waves;
1,181,337, May 2, Neve, Gearing for Phonographs and
Other Talking Machines;
1,181,655, May 2, English, Talking Machine;
1,181,864, May 2, Eilers, Sound Reproducer;
1,182,078, May 9, Elfering, Sound Box Diaphragm;
1,182,233, May 9, Waddell, Filing Cabinet for Disk
Sound Records;
1,182,551, May 9, Gabel, Automatic Talking Machine;
1,182,576, May 9, La Rue, Spring Motor for Talking
Machines and the Like;
1,182,897, May 16, Edison, Apparatus for Recording
and Reproducing Motion and Sounds;
1,182,922, May 16, Mickley, Needle Holder for a Talk-
ing Machine;
1,183,358, May 16, Emerson, Process of Making Sound
Records;

- 1,183,404, May 16, Rummler, Method and Apparatus for Reproducing Sounds;
- 1,184,060, May 23, Yerkes & Adams, Cabinet for Sound Records;
- 1,184,221, May 23, Watty, Violin;
- 1,184,268, May 23, Stone, Phonograph;
- 1,184,332, May 23, Edison, Phonograph or Talking Machine;
- 1,184,333, May 23, Edison, Phonograph or Talking Machine;
- 1,184,334, May 23, Edison, Phonograph or Talking Machine;
- 1,184,704, May 23, McDonnell, Electrical Synchronizer for Talking Motion Pictures;
- 1,184,907, May 30, Woods, Talking Machine;
- 1,184,938, May 30, Fischer, Talking Machine;
- 1,185,001, May 30, Ringel, Phonograph for Dolls or Other Toys;
- 1,185,056, May 30, Byron, Method of Making Phonographic Records;
- 1,185,149, May 30, Underhill, Sound Reproducing or Recording Machine;
- 1,185,266, May 30, Vesey, Tone Varying Attachment for Reproducing Needles;
- 1,185,311, May 30, Hahn, Sound Record;
- 1,185,559, May 30, Vaughan, Decoy;
- 1,185,877, June 6, Comer, Reproducing and Transmitting Apparatus;
- 1,185,945, June 6, Schroeter, Talking Machine;
- 1,185,987, June 6, Emerson, Light and Sound Distributing Apparatus;
- 1,185,988, June 6, English, Talking Machine;
- 1,186,190, June 6, Hibbard, Talking Machine;
- 1,186,312, June 6, Hanselmann, Disk Record Holder;
- 1,186,450, June 6, Starcke, Apparatus for Phonographically Recording Telephonically Transmitted Conversations;
- 1,186,478, June 6, Harris, File for Sound Reproducing Records;
- 1,186,494, June 6, Olinger, Synchronizer for Talking Pictures;
- 1,186,638, June 13, Woods, Locking Device for Speed Governors of Talking Machines;
- 1,186,717, June 13, Walker, Voice Recording and Reproducing Device;
- 1,186,869, June 13, Williams, Sounding Board for Phonographs;
- 1,187,040, June 13, Capps, Top Support for Talking Machine and Other Cabinets;
- 1,187,119, June 13, Winch, Means for Making and Reproducing Phonograph Records;
- 1,187,129, June 13, Bertolucci, Talking Machine;
- 1,187,146, June 13, Holland, Sound Box for Phonographs;
- 1,187,892, June 20, English, Sound Reproducing Machine;

- 1,188,078, June 20, Jones, Method of and Mold for Making Sound Boxes;
1,188,079, June 20, Jones, Sound Box for Talking Machines;
1,188,080, June 20, Jones, Sound Box for Talking Machines;
1,188,374, June 20, English, Sound Reproducing Machine;
1,188,509, June 27, Teichlauf, Stylus Lever for Phonograph Sound Boxes;
1,188,682, June 27, Rotter et al., Sound Reproducing Mechanism;
1,188,728, June 27, Capps, Talking Machine and Attachment Therefor;
1,188,744, June 27, English, Talking Machine;
1,188,872, June 27, Woerheide, Holder for Talking Machine Records;
1,188,895, June 27, Capps, Top Support for Talking Machine and Other Cabinets;
1,188,909, June 27, Dennison, Diaphragm;
1,189,063, June 27, Constantine, Phonograph Stop;
1,189,152, June 27, Marshall, Tone Purifier;

Note:-This volume contains one hundred (138) and thirty-eight patents.

ALPHABETICAL LIST
OF
PATENTEES.

GRAPHOPHONE PATENTS --- VOLUME XVI.

1916.



(Alphabetical List of Patentees)

VOLUME XVI.
GRAPHOPHONE PATENTS.

No. 1,166,602 - to - No. 1,189,152.

January - June, 1916.

Adair, M.	1,175,912;
Adams, & Yerkes,	1,184,060;
Allis, & Millet,	1,170,134;
Arthur & Rotter,	1,167,842;
Arthur & Rotter,	1,188,682;
Aylsworth, J.W.,	1,167,468;
Aylsworth, J.W.,	1,170,391;

Babson & Haug,	1,168,239;
Baer, B.A.,	1,171,082;
Bertolucci, A.,	1,187,129;
Boerries, F.S.,	1,177,227;
Boyden, G.E.,	1,168,053;
Brightson, G.E.,	1,167,972;
Byron, H.B.,	1,185,056;

Capps, F.L.,	1,181,108;
Capps, F.L.,	1,187,040;
Capps, F.L.,	1,188,728;
Capps, F.L.,	1,188,895;
Cassard, H.L.,	1,178,840;
Catucci, P.,	1,169,317;
Catucci, P.,	1,180,008;
Chapin, F.C.,	1,173,251;
Cheney, F.,	1,170,800;
Cheney, F.,	1,170,801;
Cheney, F.,	1,170,802;
Cheney, F.,	1,170,803;
Cirelli, F.,	1,167,796;
Comer, J.J.,	1,185,877;
Constantine, V.,	1,189,063;
Cook & Philpot,	1,174,274;

Dailey, W.H.,	1,168,606;
Dennison, W.N.,	1,169,134;
Dennison, W.N.,	1,188,909;
D'Oench, G.A.,	1,170,427;
Dyer, F.L.,	1,178,061;

ARTICLE I.

SECTION 1. All legislative Powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

SECTION 2. The House of Representatives shall be composed of Members chosen every second Year by the People of the several States, and the Electors in each State shall have the Qualifications requisite for Electors in that State.

SECTION 3. The Senate of the United States shall be composed of two Senators from each State, chosen by the Legislature thereof, for six Years; and each Senator shall have the Qualifications requisite for Senators in that State.

SECTION 4. The House of Representatives shall choose their Speaker and other Officers; and may determine the Rules of their Proceedings.	SECTION 5. The Senate shall choose their President and other Officers; and may determine the Rules of their Proceedings.
SECTION 6. The House of Representatives shall be assembled in one Place, which shall be called the City of New York, until such other Place as they shall by Law determine.	SECTION 7. The Senate shall sit in one Place, which shall be called the City of New York, until such other Place as they shall by Law determine.
SECTION 8. The House of Representatives shall have the sole Power of Impeachment.	SECTION 9. The Senate shall have the sole Power to try all Impeachments.
SECTION 9. The House of Representatives shall have the sole Power of Impeachment.	SECTION 10. The Senate shall have the sole Power to try all Impeachments.

SECTION 11. The House of Representatives shall have the sole Power of Impeachment.	SECTION 12. The Senate shall have the sole Power to try all Impeachments.
SECTION 13. The House of Representatives shall have the sole Power of Impeachment.	SECTION 14. The Senate shall have the sole Power to try all Impeachments.
SECTION 15. The House of Representatives shall have the sole Power of Impeachment.	SECTION 16. The Senate shall have the sole Power to try all Impeachments.
SECTION 17. The House of Representatives shall have the sole Power of Impeachment.	SECTION 18. The Senate shall have the sole Power to try all Impeachments.

SECTION 19. The House of Representatives shall have the sole Power of Impeachment.	SECTION 20. The Senate shall have the sole Power to try all Impeachments.
SECTION 21. The House of Representatives shall have the sole Power of Impeachment.	SECTION 22. The Senate shall have the sole Power to try all Impeachments.
SECTION 23. The House of Representatives shall have the sole Power of Impeachment.	SECTION 24. The Senate shall have the sole Power to try all Impeachments.
SECTION 25. The House of Representatives shall have the sole Power of Impeachment.	SECTION 26. The Senate shall have the sole Power to try all Impeachments.
SECTION 27. The House of Representatives shall have the sole Power of Impeachment.	SECTION 28. The Senate shall have the sole Power to try all Impeachments.

SECTION 29. The House of Representatives shall have the sole Power of Impeachment.	SECTION 30. The Senate shall have the sole Power to try all Impeachments.
SECTION 31. The House of Representatives shall have the sole Power of Impeachment.	SECTION 32. The Senate shall have the sole Power to try all Impeachments.
SECTION 33. The House of Representatives shall have the sole Power of Impeachment.	SECTION 34. The Senate shall have the sole Power to try all Impeachments.
SECTION 35. The House of Representatives shall have the sole Power of Impeachment.	SECTION 36. The Senate shall have the sole Power to try all Impeachments.

Edison, T.A.,	1,182,897;
Edison, T.A.,	1,184,332;
Edison, T.A.,	1,184,333;
Edison, T.A.,	1,184,334;
Eichengrun, A.,	1,175,728;
Eilers, C.W.,	1,181,864;
Elfering, J.H.,	1,182,078;
Ellis, H.,	1,177,025;
Emerson, G.E.,	1,183,358;
Emerson, G.E.,	1,185,987;
English, J.C.,	1,173,104;
English, J.C.,	1,181,655;
English, J.C.,	1,185,988;
English, J.C.,	1,187,892;
English, J.C.,	1,188,374;
English, J.C.,	1,188,744;

Faldl, R.E.,	1,172,346;
Fischer, A.,	1,184,938;

Gabel, J.,	1,182,551;
Gall, A.F.,	1,167,489;
Geer, E.S.,	1,173,501;
Gruenfeldt, E.,	1,170,530;

Haag, A.H.,	1,167,063;
Hahn, L.C.,	1,185,311;
Harris, F.W.,	1,171,118;
Harris, F.W.,	1,186,478;
Haug & Babson,	1,168,239;
Hanselmann, C.F.,	1,186,312;
Hibbard, C.L.,	1,186,190;
Holden, D.,	1,170,258;
Holland, N.H.,	1,167,500;
Holland, N.H.,	1,167,501;
Holland, N.H.,	1,178,014;
Holland, N.H.,	1,187,146;
Hollingshead, W.B.,	1,173,272;
House, & Keszthelyi,	1,166,602;
Hughes, J.W.,	1,170,447;
Hughes, J.W.,	1,175,765;

Johnson, E.R.,	1,180,401;
Johnson, F.B.,	1,167,304;
Jones, A.D.,	1,188,078;
Jones, A.D.,	1,188,079;
Jones, A.D.,	1,188,080;

Kane, T.L.,	1,172,533;
Keeler, & Washburn,	1,177,978;
Keogh, E.S.,	1,175,639;
Keszthelyi & House,	1,166,602;
Kramm, E., Jr.,	1,172,370;
Kulp, J.C.,	1,174,996;

La Rue, W.B.,	1,182,576;
Laurencich, A.,	1,172,717;
Leet, E.A.,	1,181,146;

Madden, A.L.,	1,172,380;
Marshall, C.P.,	1,189,152;
Mc Donell, G.P.,	1,184,704;
Mickley, A.J.,	1,182,922;
Millet & Allis,	1,170,134;
Morris, R.H.,	1,166,851;

Nemeth, D.,	1,176,919;
Neve, H.F.,	1,181,337;
Newman, A.M.,	1,177,887;
Norman, L.,	1,172,304;

Ober, F.S.,	1,166,925;
Ogden, J.B.,	1,167,206;
Olinger, J.B.,	1,186,494;
Oliver, E.S.,	1,168,412;
Oliver, E.S.,	1,169,861;
Opel, W.,	1,177,047;
Opferkuck & Pfeifer,	1,178,871;
Ostrom, J.S.,	1,166,627;

Pfeifer & Opferkuck,	1,178,871;
Philpot & Cook,	1,174,274;
Pierce & Wilkinson,	1,172,754;
Prout, J.T.,	1,167,838;
Poposkey, A.B.,	1,170,325;

Ringel, H.,	1,185,001;
Rostrom, J.D.,	1,168,910;
Rotter & Arthur;	1,167,842;
Rotter & Arthur;	1,188,682;
Royal, B.G.,	1,170,675;
Rummler, R.,	1,183,404;

Sabine, W.C.,	1,172,838;
Sanders, J.,	1,179,660;

Scalbom, O.L.,	1,170,997;
Schiffl, C.,	1,174,292;
Schroeter, C.,	1,185,945;
Seelau, F.,	1,168,432;
Segal, S.,	1,173,316;
Sexton, A.J.,	1,174,358;
Starcke, H.,	1,186,450;
Stone, G.L.,	1,184,268;
Sutlive, J.H.,	1,176,326;

Taliaferro, E.E.,	1,174,454;
Teichlauf, H.,	1,188,509;
Teske, C.,	1,173,466;
Turner, I.S., & T.V.,	1,175,205;

Underhill, G.H.,	1,185,149;
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Vaughan, A.C.,	1,185,559;
Vessey, R.H.,	1,185,266;

Waddell, J.M.,	1,182,233;
Walker, J.L.,	1,186,717;
Waller, C.W.,	1,166,953;
Washburn & Keeler,	1,177,978;
Watty, H.,	1,184,221;
Weczerzick, V.W.,	1,173,758;
Whitehead, R.A.,	1,179,591;
Wilkinson & Pierce,	1,172,754;
Williams, O.B.,	1,186,869;
Winck, C.F.,	1,187,119;
Woerheidle, W.H.,	1,188,872;
Woods, C.E.,	1,184,907;
Woods, C.E.,	1,186,628;

Yerkes & Adams,	1,184,060;
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DESIGN PATENTS.

Note:- All of the Design patents issued for
Graphophone constructions during the year of
1916 are bound in the back of Volume XVII.

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THE HISTORY OF THE

REIGN OF KING CHARLES THE FIRST
BY JOHN BURNET
OF THE SOCIETY OF THE APOSTOLICAL APOSTLES
IN THE CITY OF LONDON

LONDON Printed by J. Streater at the Sign of the Gun in St. Dunstons Church-yard 1682

SOUND BOX,
1,166, 602-----A. S. Keszthelyi & F. House,
Patented-January 4th, 1916.
Filed-Sept. 22, 1913.
Renewed-June 2, 1915.

A. S. KESZTHELYI & F. HOUSE.
SOUND BOX.

APPLICATION FILED SEPT. 22, 1913. RENEWED JUNE 2, 1915.

1,166,602.

Patented Jan. 4, 1916.

Fig. 1.

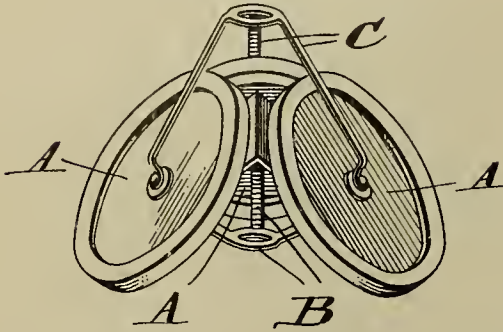


Fig. 2.

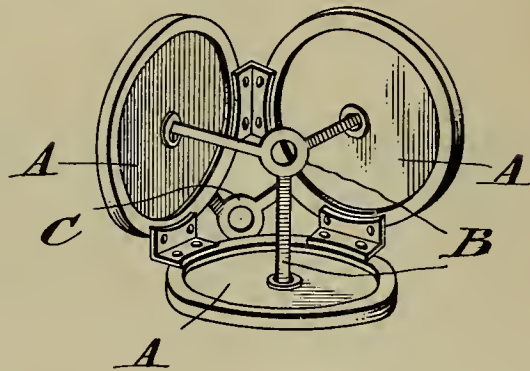
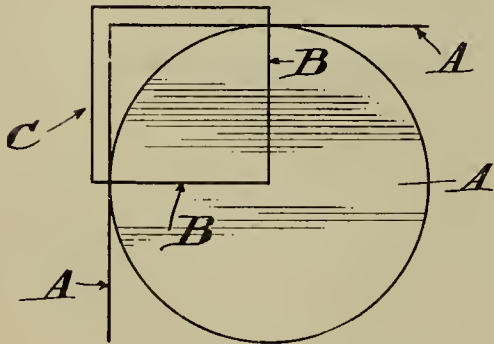


Fig. 3.



Witnesses:
Harry Willard
G. Grenage

Inventors:
A. S. Keszthelyi
Frank House

UNITED STATES PATENT OFFICE.

ALEXANDER S. KESZTHELYI AND FRANK HOUSE, OF LOS ANGELES, CALIFORNIA,
ASSIGNORS, BY MESNE ASSIGNMENTS, TO SAID KESZTHELYI.

SOUND-BOX.

1,166,602.

Specification of Letters Patent.

Patented Jan. 4, 1916.

Application filed September 22, 1913, Serial No. 791,260. Renewed June 2, 1915. Serial No. 31,661.

To all whom it may concern:

Be it known that we, ALEXANDER S. KESZTHELYI, a citizen of Hungary, and FRANK HOUSE, a citizen of the United States, both residing in Los Angeles, in the county of Los Angeles and State of California, have jointly invented new and useful Improvements in Sound-Boxes, of which the following is a specification.

10 This invention relates to improvements in sound boxes utilized in recording and reproducing sounds or sound vibrations, such sound boxes being employed in standard practice in telephony and phonography. In
15 such sound boxes as heretofore customarily constructed a single diaphragm or vibratory member has been employed to receive sound vibrations prior to the recordation thereof, and to reproduce sound vibrations under the
20 action of a suitable mechanism. Such single diaphragm operates vibratorily, principally on a line or in a path of vibration at right angles to its surface. We have determined by experimentation that the true sound wave
25 form comprises motions propagating in all directions, rectangularly related, in fact in the three dimensions of space. In other words, such sound waves are propagated by vibrations in a path at any angle to the sur-
30 face of the vibrating member, and also in other paths at angles each to the others and parallel with and at angles to the surface of the vibratory member or diaphragm. This propagation of vibration in paths other
35 than a directly radial or rectilinear one, has been established with respect to other forces or manifestations of energy, such as magnetism and light, in which propagation transversely to a rectilinear path has been
40 found to occur. With respect to the propagation of sound waves, our contentions as above stated are supported not only by the results which we have obtained in consonance with such theory, but by many authori-
45 ties, such as Daniell on Physics with particular reference to pages 433 and 448.

Having determined that sound waves comprise the three directions of motion above pointed out, we determined to reorganize sound boxes so that the structures thereof might agree in performance with the theory stated. To that end, we have

produced a sound box comprising three, or a multiple of three diaphragms, membranes or vibratory members, all set in equal angular relation each to the other, and preferably or approximately in rectangular relation each to the other, whereby such compound and complex motion comprised in the sound wave activity may be sensitively and accurately utilized for a clearer and more full recordation or reproduction of sound combined with better quality thereof. Such plurality or battery of vibratory members, constitutes a working unit, all of the vibratory members being positively or rigidly connected together for rigid connection to a common stylus, carbon button or other electrical or electro-magnetic element, or the like, for joint action and service in recordation and reproduction of sound. In its broad aspects, the invention is not concerned in the character and relative arrangement and construction of the means of receiving from or transmitting to the vibratory members the motion incident to recording or reproducing sound. We have devised certain elements of this nature particularly adapted for the practice of our invention, but the same do not enter into the broad invention under present treatment. The several vibratory members are rigidly held in a suitable sound box frame, in the angular relations set forth. And because of the utilization of all the three angularly related motions of a true wave form, we are enabled, as above stated, to truly record and truly reproduce sounds without the many defects, distortions and blurs incident to use of sound boxes as customarily produced. It will be manifest that many kinds and qualities of vibratory members may be employed, and many kinds and qualities of connections between the same, both mechanical and electrical, may be employed, within the broad scope of the invention, which contemplates the provision of a plurality of jointly operating or inter-related vibratory members attuned or responsive respectively to the component motions or phases of motion of sound waves.

In another application filed later by Alexander S. Keszthelyi, of us, certain modifications, elaborations and pertinent features

are disclosed and claimed, such application being for sound-boxes, filed February 24, 1914, Serial Number 820,580.

With respect to the connections between or among the several vibratory members and the motion receiving or imparting elements operating the same or operated by the same, in reproduction and recordation, it is at times found preferable, such as when using magnetic motion translators or producers, to use non-magnetic material for such connections.

In the drawing, in which we have illustrated without attention to immaterial detail, and also diagrammatically, the embodiment of our invention in certain primitive although operative forms, Figure 1 is a perspective view of certain sound box features embodying the invention; Fig. 2 is an angularly different view of Fig. 1; and Fig. 3 is a diagrammatic view, illustrating the interrelation of features or elements shown in Figs. 1 and 2.

Corresponding parts in all the figures are designated by the same reference characters.

Referring with particularity to the drawing, A in each instance designates a diaphragm, B designates rigid or positive connections between or among the several diaphragms or vibratory members, and C, designates a further rigid or positive connection of the same kind, such connections being respectively with opposite faces of the diaphragms and being adapted for rigid or positive connection with a common stylus, electrical or electromagnetic element, or the like. It will be understood that the number of these connections will be dependent upon the service to which the sound box is subjected, both being used for instance when a number of the groups of diaphragms are combined.

In the drawings, specifically, we have shown the diaphragms as mounted in rigid frames rigidly connected together, the connections B. and C. springing from the central portions of the diaphragms at right angles thereto. The members A. are of the same construction and operative extent, and have equal freedom of motion. It will be noted that the three diaphragms in Fig. 1 are rectangularly related each to the other, as are the three diaphragms in Fig. 2, in order that all the directions of motion of the sound waves may be accurately utilized, as above set forth, in recording and reproducing sound. It will of course be understood that slight or even material variations from this strict rectangular relation between the vibratory members will result in better sound recordation and reproduction than in the use of sound boxes having a single diaphragm. Therefore, within the scope of our invention, in addition to a wide range

of equivalent and substitute features and parts, it is to be understood that the provision of the plurality of diaphragms or vibratory members in equal angular relation each to the other, irrespective of the specific nature of such angular relation, is to be included.

Having thus disclosed our invention, we claim and desire to secure by Letters Patent:

1. In a recording or reproducing sound box, three vibratory members in equal angular relation each to the others, and positive means of connection between said vibratory members.

2. In a recording or reproducing sound box, three vibratory members in equal angular relation each to the others, and positive means of connection between said vibratory members; said means of connection being adapted for the accommodation of motion producing or translating element.

3. In a recording or reproducing sound box, three vibratory members in equal angular relation each to the others, and means of rigid connection among the members.

4. In a recording or reproducing sound box, three vibratory members in equal angular relation each to the others, and means of positive connection among the members, all of said vibratory members being similarly constructed and having equal freedom of motion.

5. In a recording or reproducing sound box, three vibratory members in equal angular relation each to the others, and rigid connections between said vibratory members rectangularly springing from the central portions thereof.

6. In a recording or reproducing sound box, three vibratory members in equal angular relation each to the others, and rigid connections between said vibratory members at the central portions thereof; and means holding said vibratory members rigidly together at their marginal portions.

7. In a recording or reproducing sound box, three vibratory members mounted each at right angles to the other two and positive means of connection between the members.

8. In a recording or reproducing sound box, three vibratory members mounted in equal rectangular relation each to the other two, and means of rigid connection among the members.

9. In a recording or reproducing sound box, three vibratory members mounted at their marginal portions in rectangular relation each to the other two, and means of positive connection among the members; all of said members having equal freedom of motion.

10. In a recording or reproducing sound box, three vibratory members rectangularly mounted each to the other two, and a posi-

tive connection from each vibratory member to accommodate a motion producing or translating element.

11. In a recording or reproducing sound box, three vibratory members rigidly mounted at their marginal portions each at right angles to the other two and rigid connections from each vibratory member springing at right angles from the central portions thereof.

12. In a recording or reproducing sound box, three vibratory members mounted with their marginal portions in rectangular relation each to the other two and a positive connection among the vibratory members, and means for holding said vibratory members rigidly together at their peripheries.

13. In a recording or reproducing sound box, three vibratory members rigidly mounted and connected each at right angles to the

other two, to accommodate a connection to a source of motion, to build a correctly formed sound wave.

14. In a recording or reproducing sound box, three vibratory members rigidly mounted and connected each at right angles to the other two, and means to accommodate a source of motion for the building of a true wave form.

15. In a recording or reproducing sound box, three vibratory members rigidly mounted and fastened at their marginal portions in planes at right angles each to the other two, and a connection from each vibratory member to accommodate a source of motion.

ALEXANDER S. KESZTHELYI.

FRANK HOUSE.

Witnesses:

MINERVA DE VINE,

L. V. SWIGGETT.

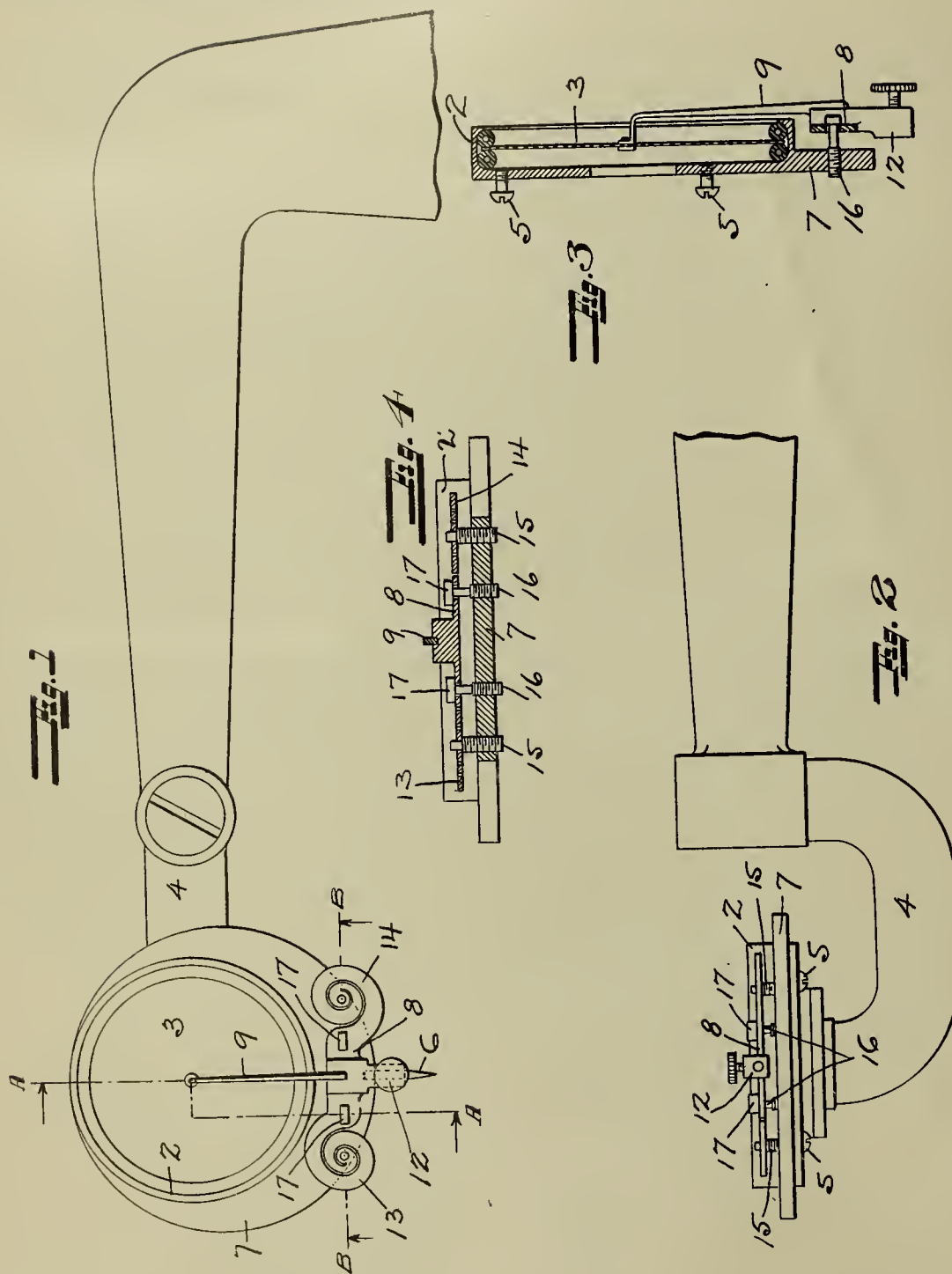
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND BOX,
1,166,627-----J. S. Ostrom,
Patented-January 4, 1916.
Filed-November 30, 1914.

J. S. OSTROM.
SOUND BOX.
APPLICATION FILED NOV. 30, 1914.

Patented Jan. 4, 1916.

1,166,627.



WITNESSES:

J. B. Gardner.
H. G. Frost.

INVENTOR.
JOHN S. OSTROM
BY *White & Frost.*
his ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN S. OSTROM, OF SAN FRANCISCO, CALIFORNIA.

SOUND-BOX.

1,166,627.

Specification of Letters Patent.

Patented Jan. 4, 1916.

Application filed November 30, 1914. Serial No. 874,790.

To all whom it may concern:

Be it known that I, JOHN S. OSTROM, a citizen of the United States, and a resident of the city and county of San Francisco, State of California, have invented a new and useful Sound-Box, of which the following is a specification.

The invention relates to sound boxes for sound reproducing or recording machines.

10 An object of the invention is to provide a sound box which will cause a clear and correct reproduction of the sound.

Another object of the invention is to provide a sound box in which the vibrations are 15 unhampered in their travel between the stylus and diaphragm.

The invention possesses other advantageous features, some of which, with the foregoing, will be set forth at length in the following description, where I shall outline in 20 full that form of the invention which I have selected for illustration in the drawings accompanying and forming part of the present specification.

25 In the drawings I have shown only one specific form of my generic invention, but it is to be understood that I do not limit myself to such form because my invention may be embodied in a multiplicity of forms, each 30 being a species of my said invention.

It is also to be understood that by the claims succeeding the description of my invention, I desire to cover the invention in whatever form it may be embodied.

35 Referring to said drawings: Figure 1 is a side view of the sound box of my invention mounted on the sound conducting arm, the sound box being shown with the stylus at right angles to the arm for purposes of convenience. Fig. 2 is an underneath view of 40 the sound box and arm taken in the position shown in Fig. 1. Fig. 3 is a cross section of the sound box taken on the line A—A Fig. 1. Fig. 4 is a cross section of the sound box taken on the line B—B Fig. 1. 45

The sound box of my invention comprises the casing 2 in which the diaphragm 3 is arranged in any suitable manner. The casing is securely attached to the horn or sound 50 conducting arm or tube 4, by any suitable means, such as the screws 5. The sound box is usually arranged so that the needle or stylus 6 lies at an acute angle to the adjacent surface of the sound record, but in the 55 drawings, for the purpose of convenience,

the needle is disposed so that it lies at a right angle to the surface of the record.

Secured to the casing 2 and preferably formed integral therewith, is a plate 7, preferably circular in shape and arranged eccentrically with respect to the casing, so that a portion of the plate extends below the casing. Mounted on the plate 7 below the casing is a resilient element 8 to which the stylus bar 9 and the stylus holder 12 are rigidly attached, preferably by brazing. The resilient 65 element to which the stylus bar and stylus holder are attached comprises a flat bar formed at its opposite ends in the shape of flat spirals 13—14, which act as springs to 70 produce the resiliency of the element. The bar forming the spirals has its greater cross sectional dimension in a plane parallel to the plane of the diaphragm and its smaller cross sectional dimension in a plane at right angles 75 to the plane of the diaphragm, and the flat spirals lie substantially in a plane parallel to the plane of the diaphragm, so that the portion of the bar intermediate the spirals is free to vibrate in any direction, but more 80 particularly in a plane at right angles to the plane of the diaphragm. Therefore, the vibrations produced by the record on the stylus are conveyed to the diaphragm without any damping effect. 85

The spring bar 8 is mounted on the plate 7 in such manner that it is free to vibrate under the influence of the impulses of the sound record. The bar is supported at its opposite ends by pins or screws 15, which engage the 90 bar at the centers of the spirals. The pins 15 are preferably screwed into the plate 7, and at their outer ends fit snugly into holes at the centers of the spirals. These pins serve the purpose of carrying or supporting 95 the resilient bar. The bar is pressed onto the pins 15 by means of the screws 16 arranged at opposite sides of the center of the bar. These screws 16 pass through clearance 100 holes in the bar so that the bar may vibrate, and engage the plate 7. The screws 16 and the pins 15 are aligned and lie in a plane at right angles to the stylus bar 9, so that the stylus bar is in effect resiliently pivoted at the line drawn through the pins and screws, 105 thereby allowing the stylus bar to vibrate freely as a whole under the influence of the impulses of the record. The impulses or markings of the record are usually at right angles to the plane of the diaphragm and by 110

constructing the stylus bar mounting so that the stylus bar may readily vibrate in the plane at right angles to the diaphragm, the vibrations on the record are efficiently conveyed to the diaphragm. The clamping screws 16 are preferably provided with elongated heads 17 which are disposed in the direction of the line through the pins, so that the heads will not interfere with the vibration of the bar. The tension on the stylus bar carrying bar 8 may be varied by adjusting the carrying pins or the clamping screws or both. The stylus bar is firmly but resiliently supported and is resiliently mounted between the needle and the connection with the diaphragm, so that all of the vibrations of the record are conducted directly to the diaphragm.

I claim:

1. In a sound box, a casing, a diaphragm arranged in said casing, a stylus bar attached to said diaphragm, a bar to which said stylus bar is attached, said last named bar being provided at its ends with flat spiral portions, and means for supporting said last named bar at its ends.

2. In a sound box, a casing, a diaphragm arranged in said casing, a stylus bar attached to said diaphragm, and a flat bar having flat spiral ends supported at its ends on said casing and to which said stylus bar is attached, the stylus bar lying at a right angle to a line through the points of support of the flat bar.

3. In a sound box, a casing, a diaphragm arranged in said casing, a stylus bar attached to said diaphragm, a flat bar having flat spiral ends to which the stylus bar is

attached intermediate said spiral ends, pins engaging the casing and the center of said spirals, and screws passing through the flat bar intermediate the spirals and engaging the casing adapted to press the bar firmly against the pins.

4. In a sound box, a stylus bar, a stylus bar mounting comprising a flat bar having spiral ends, means for supporting the flat bar at its ends, and means arranged intermediate the ends for pressing the bar against said supporting means, the pressing means and the supporting means being alined and being disposed in a plane at right angles to the stylus bar.

5. In a sound box, a stylus bar, a flat bar having flat spiral ends to which the stylus bar is attached intermediate said ends, supporting pins engaging the center of the said spiral ends and tension screws passing through the flat bar intermediate the spirals, said supporting pins and tension screws being in alinement.

6. In a sound box, a stylus bar, and a supporting bar for said stylus bar terminating in flat spiral portions.

7. In a sound box, a stylus bar, and a flat bar having spiral ends to which said stylus bar is attached, said flat bar being supported at the center of said spiral ends.

In testimony whereof, I have hereunto set my hand at San Francisco, California, this 25th day of November, 1914.

JOHN S. OSTROM.

In presence of—

H. G. PROST,
M. LE CONTE.

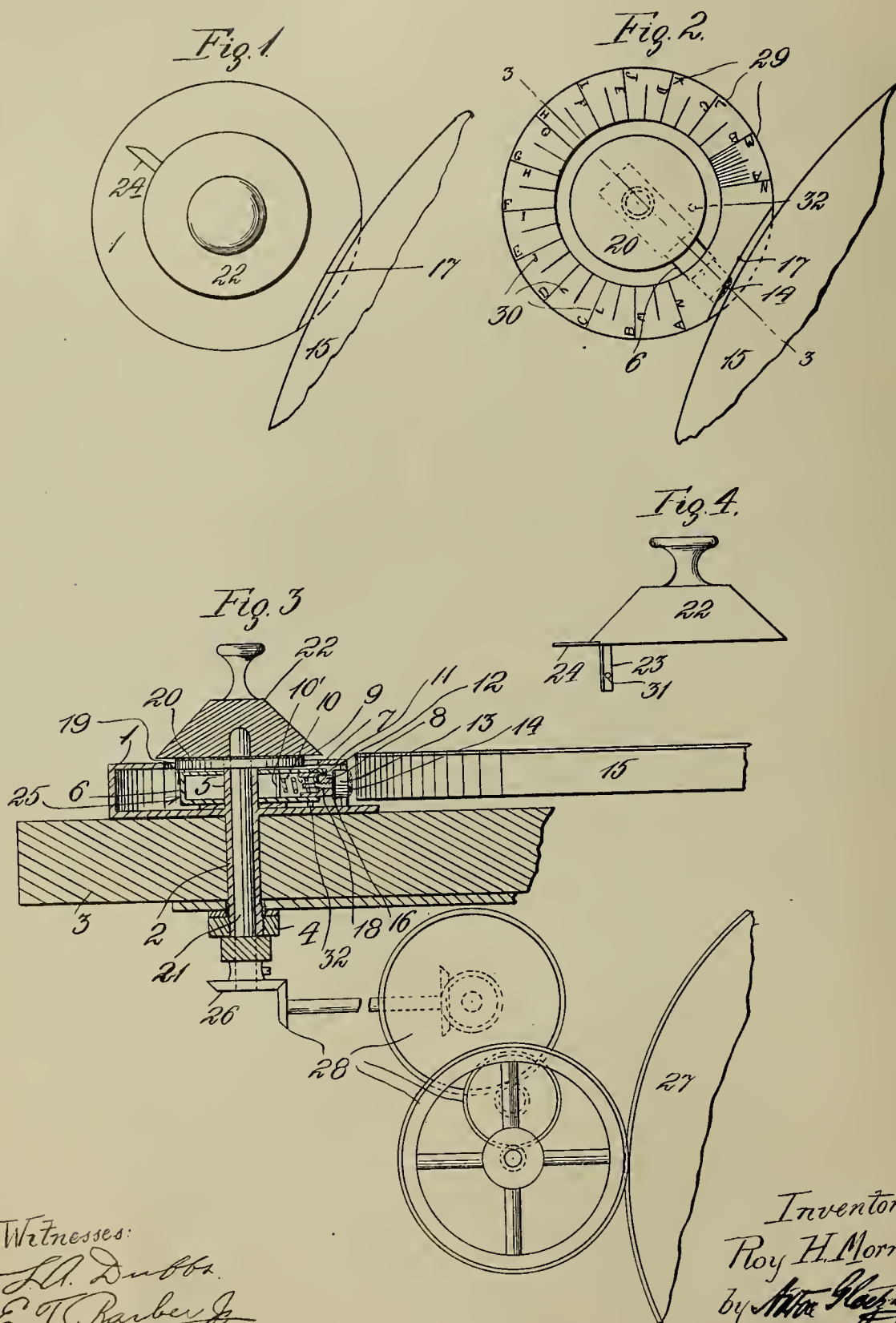
-1,166,851

STOP FOR TALKING MACHINES,
1,166,851-----R. H. Morris,
Patented-January 4th, 1916.
Filed-July 7th, 1914.

R. H. MORRIS.
STOP FOR TALKING MACHINES.
APPLICATION FILED JULY 7, 1914.

Patented Jan. 4, 1916.

1,166,851.



Witnesses:
L. H. Dubbs.
E. T. Barber Jr.

Inventor:
Roy H. Morris,
by *Wm. H. Hays*
his Atty.

UNITED STATES PATENT OFFICE.

ROY H. MORRIS, OF LOS ANGELES, CALIFORNIA.

STOP FOR TALKING-MACHINES.

1,166,851.

Specification of Letters Patent.

Patented Jan. 4, 1916.

Application filed July 7, 1914. Serial No. 850,824.

To all whom it may concern:

Be it known that I, ROY H. MORRIS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a certain new and useful Improvement in Stops for Talking-Machines, of which the following is a specification.

My invention relates to an automatic stop for talking machines of the disk type, and has for one of its objects to provide a stop mechanism in which the point of stopping of the turntable when the record carried thereby has been reproduced, may be previously and accurately determined and in which the actuation of the stop is positive and precisely in accordance with the point predetermined.

Another object of this invention is to provide a simple and effective stop, which may be quickly attached to a talking machine and which is controlled by mechanism connected with the motor.

With these and other objects in view, this invention consists of the features, details of construction and combination of parts described in connection with the accompanying drawing and then more particularly pointed out in the claims.

In the drawing, Figure 1, is a plan view of the stop containing housing showing the indicator. Fig. 2, is a plan view showing the indicating face of the housing, the stop being shown partly in dotted lines. Fig. 3 is a sectional elevation on lines 3—3, Fig. 2, showing the stop mechanism and the motor controlled means for actuating the stop, and Fig. 4, is an elevation of the stop actuating and indicating member.

The invention consists preferably of an annular housing 1, having centrally thereof a hollow stem 2, arranged to extend through the top 3, of a talking machine, and being threaded at its end to receive a nut 4, whereby the housing may be firmly secured to the said top 3. A portion of said hollow stem 2, extends into the housing 1, as shown at 5, and this portion forms a bearing for a stop-carrying member 6, in the longer end 7, of which is slidably mounted a plug 8, having a socket 9, for receiving a tension spring 10, which normally holds said plug projected and the shoulder 11, thereof in engagement with a lip 12, formed on said carrying member 6. Said spring 10, is held in position by a pin 10', extending transversely of said

carrying member 6. The plug 8, is provided with an adjustable stop 13, having a rubber or other suitable facing 14, for engagement with the periphery of a turntable 15, of a talking machine. The adjustment of said stop 13, may be effected in any suitable manner, as by a threaded stem 18 on said stop 13, engaging a threaded orifice in said plug 8, a suitable lock nut 16, being provided to lock said stop in position of adjustment. A portion of the wall of said housing 1, adjacent the turntable 15, is cut away as at 17, to permit the stop 13, to project therethrough and engage the turntable. Rotatably mounted on said hollow stem 2, is a plate 20, having a shaft 21, extending for a short distance above the level of said plate and through said hollow stem 2. Said plate 20, is of smaller diameter than and fits in an opening 19, in said housing, for the purpose of leaving a space between said table and opening. Loosely fitting over that portion of said shaft which extends above, and resting on said plate 20, is a weight 22, having an arm 23, which extends downwardly into the housing, and an indicator 24, extending outwardly from said member 22, over the face of the dial or indicating marks on the face of the housing. The arm 23, of the member 22, is so arranged that it will pass the shorter end 25, of said stop-carrying member 6, but will engage the longer end 7, and bring the stop 13, in contact with said turntable. On the end of said shaft 21, is a bevel pinion 26, to which power is transmitted from the motor 27, of a talking machine, through a train of reducing gears 28, of either the tooth or friction type as desired.

The face of said housing is inscribed with suitable indicating marks, preferably consecutively arranged, as shown in Fig. 2, these marks in this instance consisting of a series 29, of outside letters, running from A to N, and a series 30 of inside letters, running from N to A. The inside series of letters are provided to determine the length of the record, while the outside series is used to set the indicator for actuation of the stop upon completion of the reproduction of the record. Thus to determine the length of a record, the indicator 24, is set on the line marked A of the inside series 30, and the turntable then set in motion. When the reproduction of the record is completed, the indicator will have traveled over the face

of the housing and will be stopped in its travel with the stopping of the turntable. The designation on the face of the housing at which the indicator has stopped is then
 5 by preference, noted on the face of the record, so that any user may set the stop in accordance with the legend contained on each record thus marked. For instance if
 10 the indicator has stopped at F on the inside series 30, such F is marked on the record. The corresponding F of the outside series 29, is then the point at which the indicator must be set to cause the arm 23, to actuate
 15 the stop when the record is completed, and when the indicator reaches the line marked A of the outside series. Assuming, therefore, that the indicator 24, has been set at F on the outside series 29, and that the motor is set in motion, the weight 22, will revolve
 20 with the plate 20, and the arm 23, on said weight, will engage and move the stop carrying member 6, and bring the stop 13, in engagement with the periphery of the turntable upon the completion of the reproduction of a record. Such operation of the
 25 stop carrying member 6, will occur irrespective of the position it occupies in the housing, that is to say, the stop carrying member may be moved by the arm for the entire distance of the travel of said arm, or it may be
 30 moved for a distance sufficient only to cause slight contact of the stop 13, with the turntable, which frictionally brings the stop carrying member to operative position.
 35 In order to insure the actuation of the stop at the proper time and to compensate for the wear of the rubber or other facing 14, the arm 23, may be provided with an adjustment in the nature of a screw 31,
 40 which may be used to cause an earlier or later actuation of the stop than that predetermined. To limit the movement of the stop-carrying member 6, about its axis, a suitable lug 32, may be provided, as shown.
 45 What I claim is:—

1. In combination with the turntable and

motor of a talking machine, a housing having a series of indicating marks, an opening therein, and a hollow stem, a stop carrying member on said stem, a shaft extending
 50 through said stem, means to transmit power from the motor to said shaft, and a member on said plate having an indicator operable over the face of said housing, and an arm
 55 depending from said member to operate said stop carrying member.

2. A brake for a talking machine, comprising a housing having a hollow stem arranged to extend through the top of a
 60 talking machine, a portion of said stem extending within said housing, a stop carrying member in said housing and loosely mounted on said stem, a shaft extending
 65 through said stem, means to transmit power from the motor of a talking machine to said shaft, a plate on said shaft and resting on said stem, a weight on said plate having an
 indicator, and a means on said weight for actuating said stop carrying member.

3. A brake for a talking machine, comprising a housing having an opening in the
 70 top and side thereof, and indicating marks on the top, and provided with a stem arranged to extend through the top of a talking machine, a portion of said stem extend-
 75 ing within said housing, a member within said housing and loosely mounted on said stem, a stop carried by said member for engaging the turntable of a talking machine, a
 80 shaft extending through said stem and having operative connection with the motor of a talking machine, a table on said shaft and resting on said stem, and a weight loosely
 85 mounted on said table and provided with an indicator and an operating arm for said stop carrying member.

In testimony whereof I affix my signature in the presence of two witnesses.

R. H. MORRIS.

Witnesses:

ANTON GLAETZNER, Jr.,

E. L. STILWELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

APPARATUS FOR RECORDING AND REPRODUCING
SOUND,

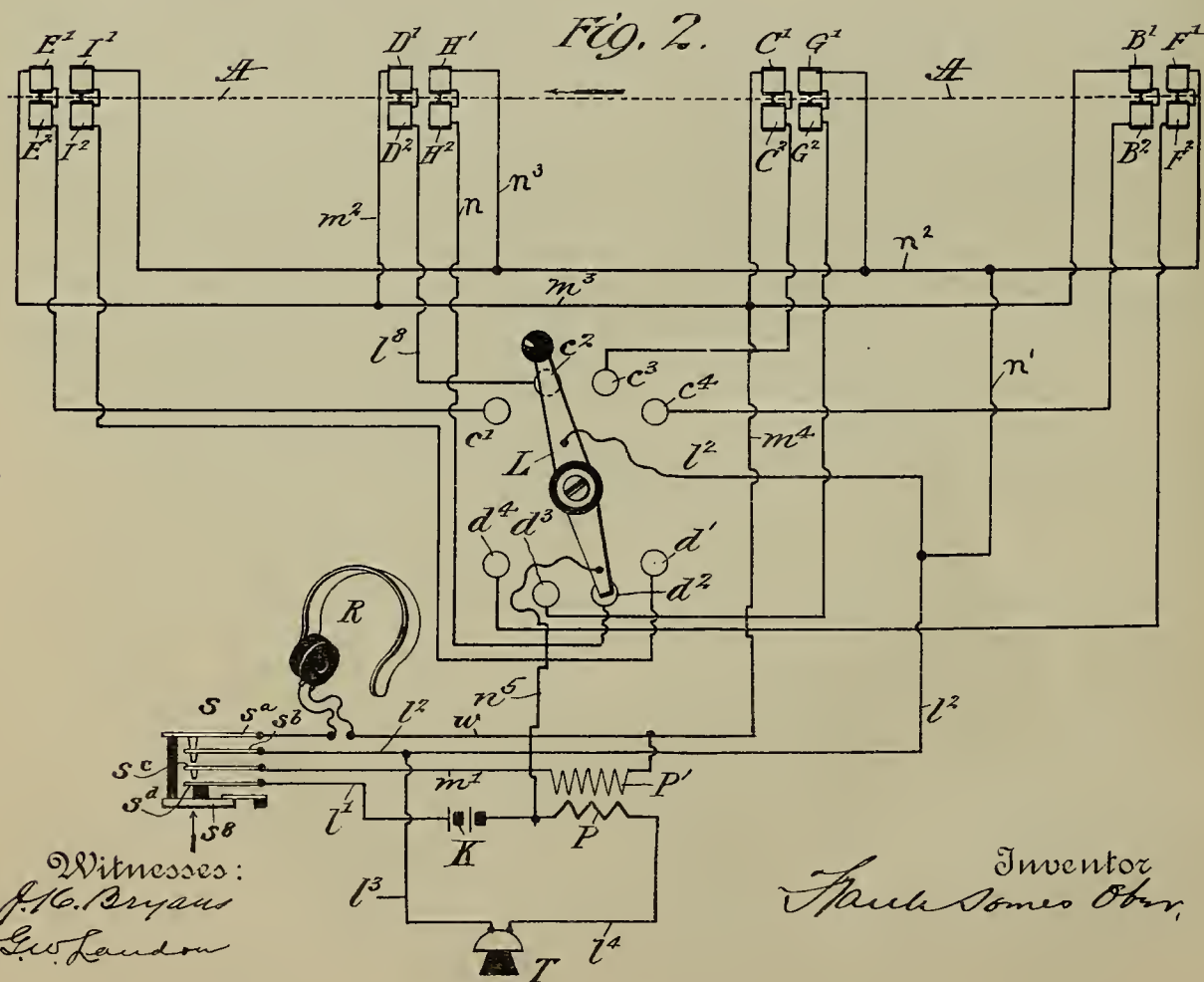
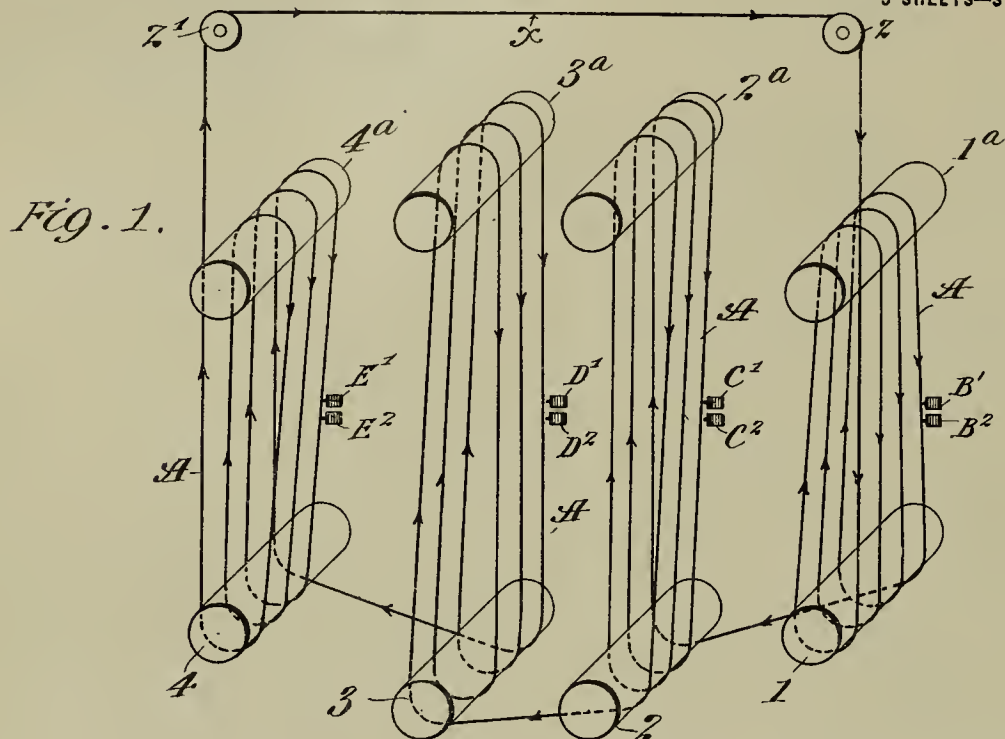
#1,166,925-----F. S. Ober, Dec'd.,
Patented-January 4th, 1916.
Filed-January 8th, 1908.

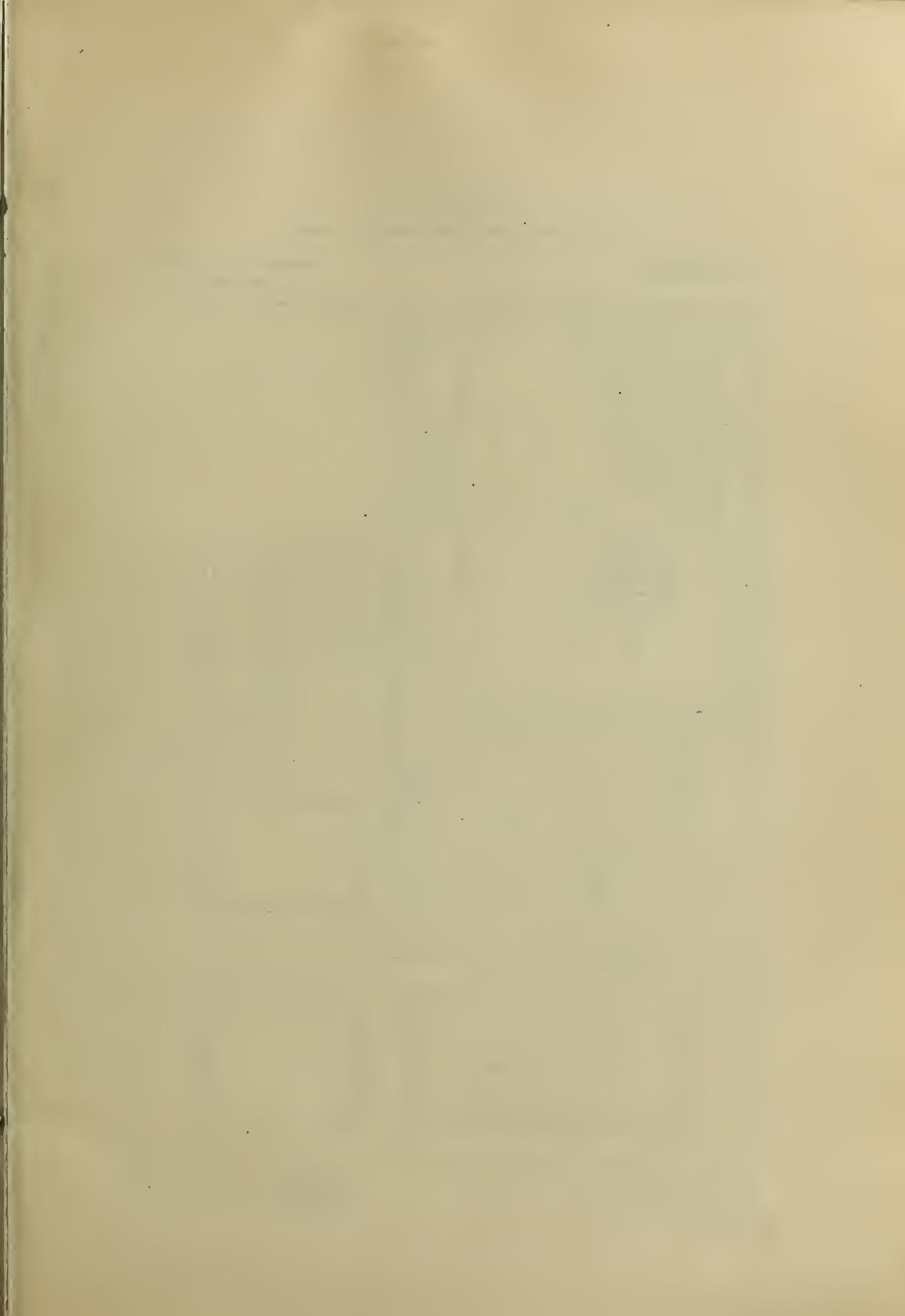
F. S. OBER, DEC'D.
J. R. & E. I. OBER, ADMINISTRATORS.
APPARATUS FOR RECORDING AND REPRODUCING SOUND.
APPLICATION FILED JAN. 8, 1908.

1,166,925.

Patented Jan. 4, 1916.

3 SHEETS—SHEET 1.



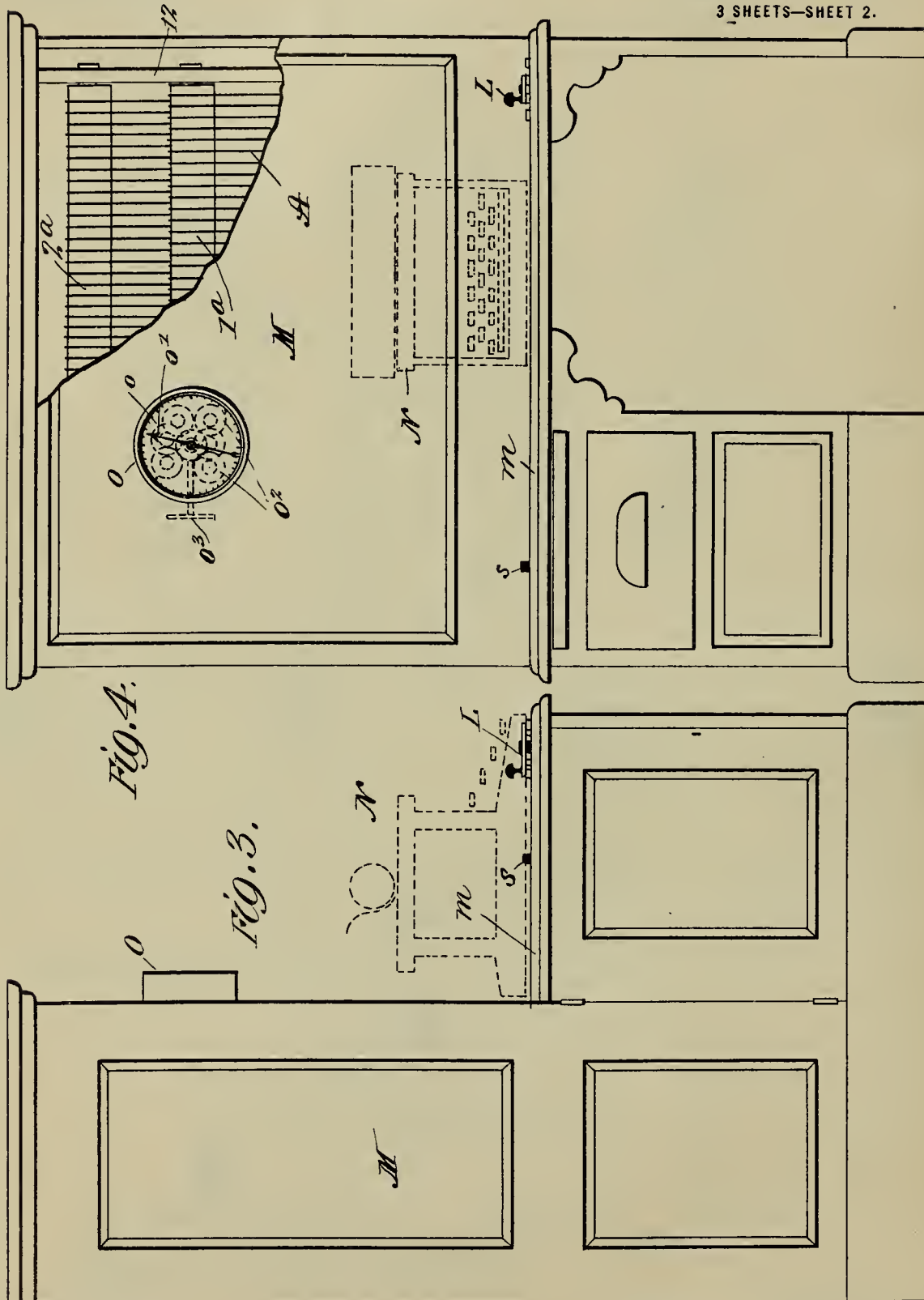


F. S. OBER, DEC'D.
 J. R. & E. I. OBER, ADMINISTRATORS.
 APPARATUS FOR RECORDING AND REPRODUCING SOUND.
 APPLICATION FILED JAN. 8, 1908.

1,166,925.

Patented Jan. 4, 1916.

3 SHEETS—SHEET 2.



Witnesses:
 J. K. Bryans
 G. W. Landon

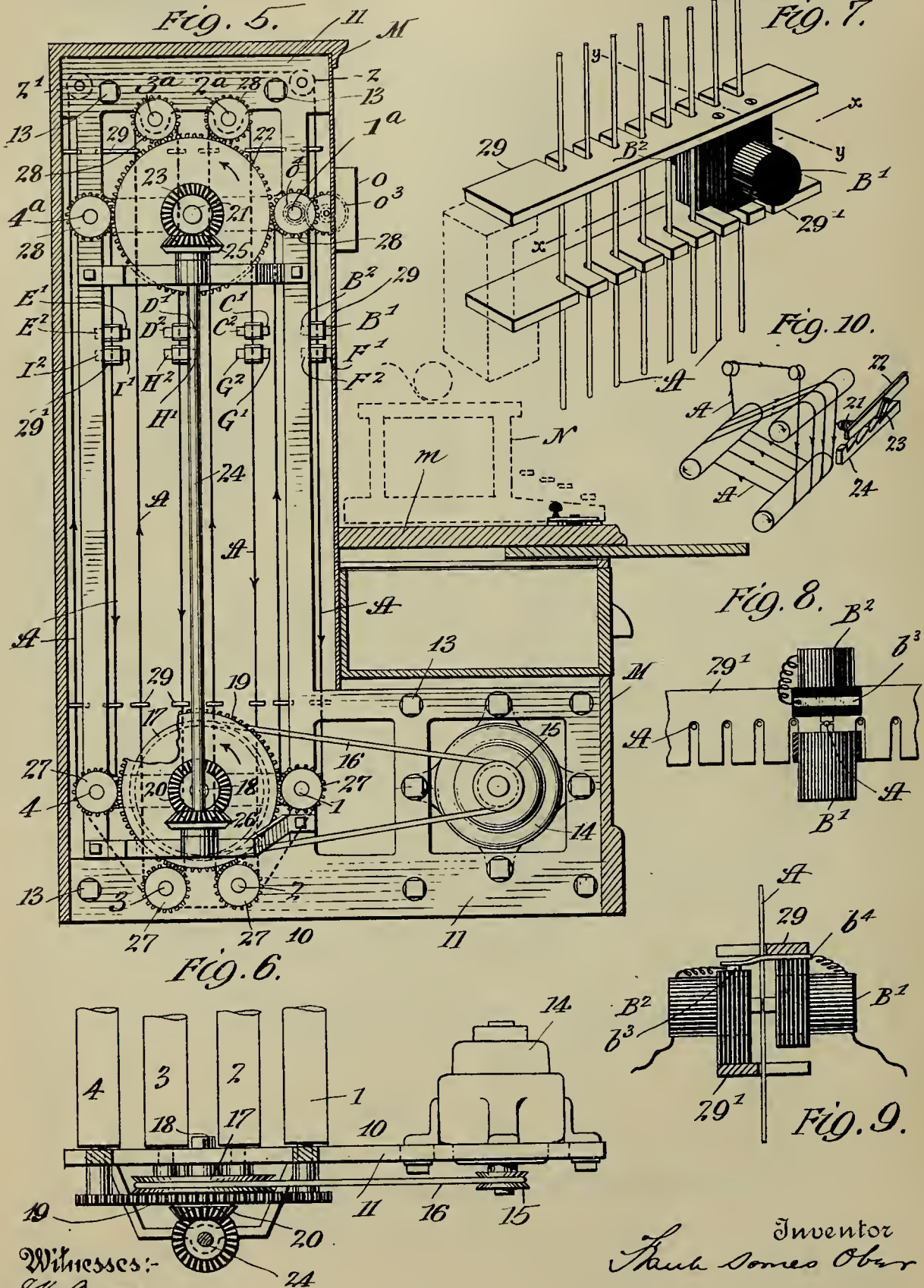
Inventor
 Frank James Ober

F. S. OBER, DEC'D.
J. R. & E. I. OBER, ADMINISTRATORS.
APPARATUS FOR RECORDING AND REPRODUCING SOUND.
APPLICATION FILED JAN. 8, 1908.

1,166,925.

Patented Jan. 4, 1916.

3 SHEETS—SHEET 3.



Witnesses:
J. H. Bryan
L. W. Landon

Inventor
Frank S. Ober

UNITED STATES PATENT OFFICE.

FRANK SOMES OBER, OF NEW YORK, N. Y.; JOSEPHINE R. OBER AND ERNEST I. OBER
ADMINISTRATORS OF SAID FRANK SOMES OBER, DECEASED.

APPARATUS FOR RECORDING AND REPRODUCING SOUND.

1,166,925.

Specification of Letters Patent.

Patented Jan. 4, 1916.

Application filed January 8, 1908. Serial No. 409,744.

To all whom it may concern:

Be it known that I, FRANK SOMES OBER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus for Recording and Reproducing Sound, of which the following is a full, clear, and exact description.

My invention relates to apparatus for recording and reproducing sound and has particular reference to machines of this character commonly known as telegraphones.

One of the well-known forms of telegraphophone is that in which the record medium is a steel wire upon which the record is impressed magnetically while said wire is traveling from one reel to another. In reproducing the record it is necessary to backwind the wire to the point thereon where the magnetically impressed record begins, and then start ahead again with the reproducing devices in circuit.

The primary object of the present invention is to produce a novel form of telegraphophone which shall provide for a traveling flexible record medium of great capacity and in which no backwinding will be required in order to reach the beginning or any part of any record impressed thereon; and which shall further provide means whereby the active effect of certain recording and reproducing devices may be transferred from point to point along the extent of the traveling medium and so enable an operator to overtake parts of said medium that have passed a given point or to drop behind in order to more quickly engage parts that are approaching a given point.

Broadly stated the invention consists of the combination of a traveling record medium of novel form, recording and reproducing devices, and novel means for establishing coöperative relations between said medium and said devices at preferred locations on the surface of said medium without reversing the movement of the latter.

More specifically the invention consists of an endless length of paramagnetic material such as steel wire arranged in successive loops upon and adapted to travel over the surfaces of two or more rollers, and having a plurality of recording and reproducing magnets arranged at suitable intervals along

the length of said wire, and means controllable by the operator whereby any of such magnets may be thrown into or out of operative relation with said traveling wire at will.

The invention will be better understood by reference to the accompanying drawings in which:

Figures 1 and 2 are diagrammatic representations of my invention; Fig. 3 is a side view of a complete machine; Fig. 4 is a front view of the same, parts being broken away; Fig. 5 is a sectional view through the casing, the inner mechanism being shown in elevation; Fig. 6 is a detailed plan view showing certain driving devices; Fig. 7 is a detailed perspective view; Fig. 8 is a section on line $x-x$ of Fig. 7; Fig. 9 is a section on line $y-y$ of Fig. 7, and Fig. 10 is a modification.

Referring to the drawings by letters and numerals in which like characters designate similar parts throughout the several views, let us first consider Fig. 1, which presents the most graphic view of the invention. For the sake of simplicity and clearness only the salient features of the invention appear in this figure, namely an endless steel wire record-medium A, a plurality of supporting and driving rollers, and a plurality of recording and reproducing magnets B^1 and B^2 , C^1 , C^2 , D^1 , D^2 , and E^1 , E^2 located at rather widely separated intervals along the length of said medium. The supporting and driving rollers are eight in number and are arranged in four pairs and are designated 1, 1^a , 2, 2^a , 3, 3^a ; and 4, 4^a .

Starting at the point x the steel wire passes over a guide pulley z down to and around roller 1, thence up to and around roller 1^a , back to and around roller 1, and so on in successive loops or spiral turns from end to end of the first pair of rollers. The last turn around roller 1, as will be observed, is led over to and around the lower roller 2 of the next pair, thence up to and around roller 2^a , back to and around roller 2, and so on in successive loops or spiral turns until the capacity of this pair is exhausted. From rollers 2 and 2^a , the wire is led to rollers 3 and 3^a , and from that pair of rollers 4 and 4^a , the same looping or spiral arrangement being maintained throughout. The last turn around roller 4 is carried up past roller 4^a to guide pulley z' , thence to point x , where

the two ends of the wire are joined together, preferably by welding.

Figs. 4, 5 and 6 show the manner of mounting and driving the rollers. 10 represents a frame consisting of the side pieces 11 and 12 and cross rods or bars 13, the side pieces being L-shaped. In the lower forward portion of the frame is hung an electric motor 14, having a pulley 15 connected by a belt 16 to a pulley 17 on a shaft 18, mounted in the frame 10. Shaft 18 also carries a spur wheel 19, and a bevel-gear wheel 20. In the upper part of the frame is a second shaft 21, also carrying a spur wheel 22 and a bevel gear wheel 23; the two bevels being connected together by a vertical shaft 24 carrying bevel gears 25 and 26 at opposite ends thereof; the arrangement being such that rotation of the motor shaft will cause both spur wheels 19 and 22 to turn in the same direction. Rollers 1, 2, 3, and 4 are each provided with reduced ends which enter bearings in the side pieces of the frame 10. Each of such rollers is further provided with a pinion 27; the several pinions each engaging a spur wheel 19. Similarly, rollers 1^a, 2^a, 3^a, and 4^a are each provided with reduced ends which are supported in the extreme upper part of frame 10, and with pinions 28 which severally engage the spur wheel 22.

All of the rollers are of precisely the same diameter and all travel at the same speed and in the same direction. It is obvious therefore that operation of the motor will cause the wire to travel in an endless path about the rollers in the same direction as, and at a speed equal to, the surface speed of said rollers.

In order to retain the wire in place, that is, to confine it to an approximately fixed path of travel, and particularly to prevent deflection of the same as it passes between the poles of magnets hereinafter described, I employ a number of combs or slotted bars 29, which are arranged transversely across the machine at suitable points and serve to separate and guide the several strands of the traveling wire. In Fig. 7 there is shown a pair of such combs or bars which are arranged rather closely together and which serve the double function of supporting a pair of recording and reproducing magnets and guiding the wire accurately between the poles thereof. One of said magnets B' is supported by the upper bar or comb 29 and lies on one side of the wire A, while the other, B², is supported by the lower comb 29' and lies on the opposite side of said wire. The poles of the magnets extending at right angles to the wire and contacting with or very closely approaching the same. Magnet B² is provided with a strip of metal b³ to which one end of its coil is attached, while the coil of magnet B' is connected

with a spring terminal b⁴, which, when the magnets are in operative position (see Fig. 9) engages the strip b³ and connects the magnets in series. This arrangement provides for the easy removal of the magnets for inspection or repair, the magnet B² being withdrawn by moving the upper bar first to the right (Fig. 9) and then endwise, and the magnet B' by moving the lower bar first to the left and then endwise. C¹, C²; D¹, D² and E¹, E², are additional recording and reproducing magnets arranged and supported in precisely the same manner as magnets B' and B², and located at suitable intervals along the length of the wire A. F¹, F²; G¹, G²; H¹, H²; and I¹, I² are erasing magnets also arranged and supported in the manner above described and serving to obliterate all previous records on the record medium when in action. A pair of erasing magnets is located just ahead of each pair of recording and reproducing magnets.

I have shown four pairs of supporting rollers simply as a matter of convenience of illustration. Obviously any other number may be employed and they may be of any desired axial length and diameter. The number and dimensions and arrangement of rollers and the number of turns of wire around them will be determined by whatever "capacity" of machine is aimed at.

Preferably the mechanism above described will be inclosed in a suitable dust proof casing as indicated at M, which may be so designed as to afford a supporting shelf or table m, for a typewriting machine N, as well as for certain switching and controlling devices hereinafter referred to. There is also mounted on the outside of the casing an indicating device O, consisting of a graduated dial o, and an index hand o' connected to a suitable train of gearing o², one of the wheels o³ of which is engaged by a pinion o⁴, on the roller 1^a. The ratio of gearing is such that the index hand will travel once around the dial with each complete cycle of the record medium.

Referring to Fig. 2, s indicates a spring switch having blades s^a, s^b, s^c and s^d. These blades are arranged and connected in such a way that in the normal position of the switch, the blades s^a and s^b are in electrical contact with one another, but in the alternate position of the switch corresponding to the recording operation of the machine the blades s^a and s^b are separated, while s^b, s^c and s^d are brought into contact.

K is a battery, P the primary of an induction coil, and P' the secondary thereof, the latter being adapted to be connected with the recording and reproducing magnets before referred to in a manner presently to be described.

R is an ordinary telephone receiver; T a transmitter, and L a double-ended pivoted

switch arm having its ends insulated from each other, and having one end thereof adapted to make electrical contact with any one of four terminals c' , c^2 , c^3 or c^4 , while the other end makes contact with similar terminals d' , d^2 , d^3 or d^4 , respectively.

When a record is to be made, the operation is as follows: The motor being started, the wire A will be caused to travel bodily over the rollers in an endless path, but inasmuch as all of the rollers travel at the same surface speed and in the same direction and pay out wire precisely as fast as they take it on, the driving force will be distributed evenly to all parts of the wire throughout, and there will be no inordinate pulls or strains at any particular point. This reduces the chances of breakage to a minimum. Having started the motor, it is unnecessary that the operator begin delivering matter for record to the transmitter at once merely in order to conserve record space. The record medium being endless, a beginning may be made at any point thereon without sacrifice of space. When, however, the operator does begin to use the transmitter, he will note the position of the index hand o' on the dial. When the hand has made a complete circuit and returns to that position, he will know that the record medium has also made a complete circuit.

When making a record, the switch s is moved to the alternate position of that shown by sustained pressure on the part s^8 , in the direction of the arrow, and a circuit is completed from battery K through wire l' , blade s^d , to blade s^c , and from thence to blade s^b , wire l^2 , wire l^3 , transmitter T, wire l^4 , primary winding P and back to battery K. The voice or other sound currents in this circuit under the influence of the transmitter induce currents in the secondary winding P' which traverse the following circuit: wire m' , blade s^c , blade s^b , wire l^2 , switch arm L, contact c^2 , wire l^8 , magnets D' , D^2 , wire m^2 , common return wire m^3 , wire m^4 , back to the secondary winding. A record is accordingly made on the traveling wire A. At the same time the erasing magnets are constantly energized from the battery in advance of the recording and reproducing magnets by the following circuit: battery K, wire l' , blade s^d , blade s^c , blade s^b , wire l^2 , wire n' , common wire n^2 , wire n^3 , magnets H' , H^2 , wire n , terminal d^2 , switch arm L, wire n^5 , back to battery. The record having been made, the reproduction thereof is accomplished by relieving pressure on the button s^8 , and allowing switch to resume normal conditions with blades s^a and s^b , in contact so that a direct circuit is formed from magnets D' , D^2 , or other reproducing magnets according to the position of the switch arm L, through wire l^8 , terminal c^2 , lever arm L, wire l^2 , blade s^b , blade s^a , receiver R, wire w , wire m^4 , back to

magnets. In this position of switch s , the circuit through the erasing magnets is broken between blades s^d and s^c .

The advantages of a record medium arranged and operated in accordance with the invention described are important and numerous. Being endless it becomes unnecessary to backward in order to change from recording to reproducing condition. In fact it is intended in practice that the wire travel always in one direction, although it is quite capable of reverse movement if for any reason reversal is desired.

The invention is particularly adaptable for use as a dictating machine for commercial purposes. In ordinary business dictation a straight-away uninterrupted flow of language is rare. There are apt to be many breaks in the delivery due to outside interruptions or pauses for thought, during which intervals of silence the record medium travels many feet. In certain well known forms of telegraphones the usefulness of long lengths of the record medium are lost because of these pauses, and they can be recovered only by back-winding, which entails considerable loss of time, or prevented only by stopping the motor, which is inconvenient. By my invention unused spaces on the record medium may be recovered simply by throwing the switch arm L ahead and cutting in other magnets. In other words, when there is a pause in the delivery, the operator is enabled to overtake the point on the traveling wire where the impression or record leaves off by cutting out the magnets he had been using, and cutting in others located ahead. For instance, if during dictation the switch arm L stands in the position shown in Fig. 2 the wire A will be acted upon by the magnets B' , B^2 , since they are the only ones in circuit in that position of the switch L. Now suppose there should be a pause in the delivery of such duration that the index hand o' travels half a revolution. The operator observing this would know that half of the length of the record medium had passed by magnets B' , B^2 , and to recover this lost space he would simply move switch arm L to the full line position and resume dictation; magnets B' , B^2 , being cut out then, and magnets D' , D^2 , which are located a distance ahead equal to half the length of the record medium, being cut in.

Should the operator be dissatisfied with, or for any reason wish to alter matter delivered to the machine, he simply throws lever L sufficiently far ahead to overtake the beginning of such matter and repeats it in amended form.

For convenience and simplicity of illustration I have shown but four sets of operating magnets, but of course a greater number could be used to advantage. In practice I purpose to use many magnets, say one to

every 200 or 300 feet of wire. Obviously the greater the number of magnets, the greater the flexibility of operation.

Instead of a number of fixed magnets operating as described above, I may employ a single movable magnet as in the manner illustrated in Fig. 10, in which 21 is the recording and reproducing magnet supported on a shifting frame 22, which is provided with a pawl 23, engaging teeth of rack 24. There are as many teeth as there are vertical strands to the endless wire A, so that when frame 22 is moved to a desired position, accurate alinement of magnets and wire may be assured.

What I claim, is:—

1. In sound recording and reproducing machines, an elongated flexible record medium of paramagnetic material arranged in a series of loops and having its ends joined together, means for moving said medium in the direction of its length, magnetic recording and reproducing devices, and means whereby a record may be effected at any one of a definite selected number of predetermined points.

2. In sound recording and reproducing machines, a plurality of rotating supports and an elongated flexible paramagnetic record medium mounted thereon in successive convolutions extending from support to support; said record medium having its ends joined together whereby any point thereon will be caused to travel in an endless path, magnetic recording devices, and means for rendering said devices effective to produce a record at any one of a number of predetermined points.

3. In recording machines, rollers arranged in a series of pairs, an elongated flexible record medium wound back and forth from roller to roller of each of said pairs successively and having its ends joined together, means for moving said medium in the direction of its length, a plurality of reproducers, and means for shifting from one reproducer to another reproducer by which the record end has yet to pass.

4. In recording machines, supporting rollers spaced apart, and an elongated flexible record medium arranged thereupon in zig-zag fashion from roller to roller, means for moving said medium in the direction of its length, and means for advancing the effective record-receiving point on the medium at the will of the operator.

5. In recording machines, an endless flexible traveling record medium arranged in a series of loops, cooperating recording devices, and means whereby such devices may be caused to become active and effect a record on the medium at any one of a definite selected number of predetermined points.

6. In recording machines, an endless flexi-

ble traveling record medium arranged in a series of loops, a plurality of recording devices located at intervals along the length of said medium, and means for throwing any individual of such devices into operative relation with said medium at will.

7. In sound recording and reproducing machines, an endless traveling paramagnetic record medium arranged in a series of loops, a plurality of magnetic recording and reproducing devices located at intervals in the path of travel of said medium, and a selecting switch for throwing any of such magnetic devices into an electric circuit.

8. In sound recording and reproducing machines, an endless traveling paramagnetic record medium arranged in a series of loops, a plurality of magnetic recording and reproducing magnets located at intervals along the path of travel of said medium, and a selecting switch for throwing any of such magnetic devices into an electric circuit.

9. In recording and reproducing machines, an endless flexible paramagnetic record medium arranged in a series of loops or convolutions, means for moving the same, devices for separating and guiding the several convolutions of said record medium, a plurality of magnetic devices supported by said separating and guiding devices, and means whereby operative relations may be established between said wire and any of said magnetic devices.

10. In recording and reproducing machines, an endless paramagnetic record medium arranged in a series of loops, means for moving the same, devices for separating and guiding the several convolutions of said record medium, a plurality of magnetic devices adjacent said separating and guiding devices, a telephone circuit, and a selecting switch whereby any of said magnetic devices may be connected with said telephone circuit.

11. In recording machines, a group of rollers having pinions, a spur wheel common to all of said pinions of said group of rollers, means for driving said spur wheel, and an endless flexible record medium supported and driven by said rollers.

12. In recording machines, a series of rollers divided into two separated groups, pinions on said rollers, a spur wheel common to all pinions of one group, a similar spur wheel common to all pinions of the other group, an endless flexible record medium supported and driven by said rollers, and common means for driving both spur wheels.

13. In recording machines, a group of rollers divided into two separated groups, pinions on said rollers, a spur wheel common to all pinions of said group of rollers, means for driving said spur wheel, an endless flexible paramagnetic record medium supported and driven by said rollers, magnetic recording devices, adapted to cooperate

with said medium, and means for transferring the active effect of said magnetic devices from one point on said medium to another.

5 14. In recording machines, a series of rollers divided into two separate groups, pinions on said rollers, a spur wheel common to all pinions of one of said groups, a similar spur wheel common to all the pinions
10 of the other of said groups, an endless flexible record medium supported and driven by said rollers, common means for driving both of said spur wheels, recording devices adapted to cooperate with said medium, and means
15 for transferring the active effect of said devices from one point on said medium to another.

15. In recording machines, an elongated

flexible record medium arranged in a series of loops, means for moving said medium in 20 the direction of its length, and devices for separating and guiding the several strands of the said loops.

16. In recording machines, an elongated flexible record medium arranged in a series 25 of loops, supports therefor, devices for separating and guiding the several loops of said medium, and recording and reproducing devices supported by said separating and guiding devices. 30

In witness whereof, I subscribe my signature, in the presence of two witnesses.

FRANK SOMES OBER.

Witnesses:

G. W. LANDON,
J. K. BRYANS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH SOUND BOX,
1,166,953-----C. W. Waller,
Patented-January 4th, 1916.
Filed-April 30th, 1915.

1,166,953.

Patented Jan. 4, 1916.

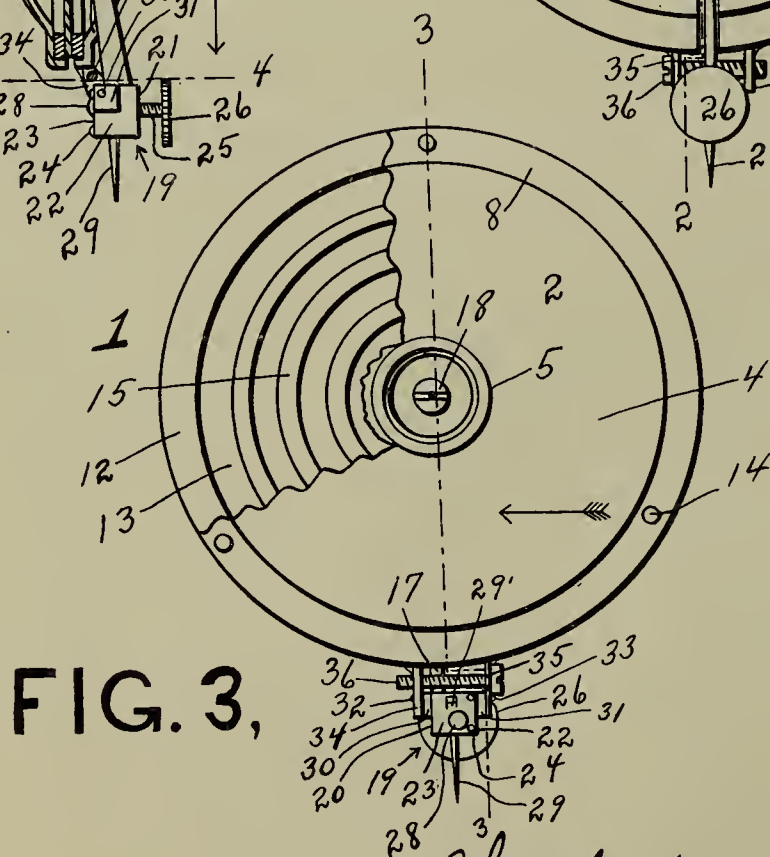
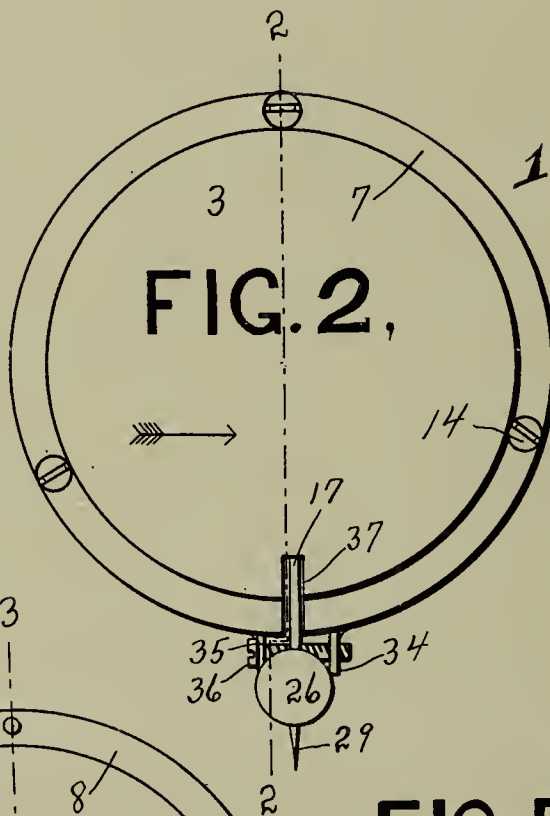
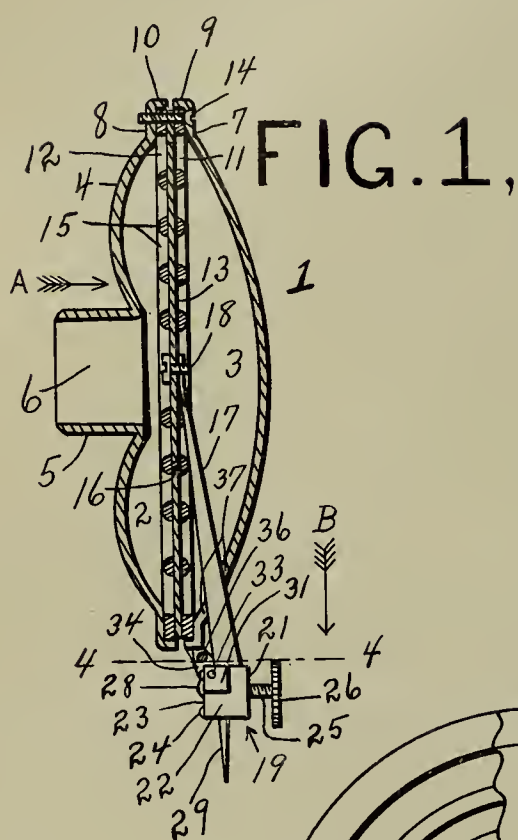


FIG. 5.

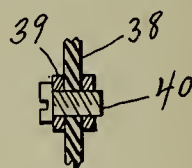
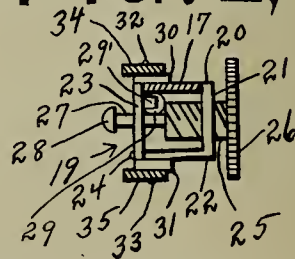


FIG. 4,



Charles W. Waller INVENTOR.

WITNESSES:

Jennie V. Bergland
Fred. E. Johnson

UNITED STATES PATENT OFFICE.

CHARLES W. WALLER, OF CHICAGO, ILLINOIS.

PHONOGRAPH SOUND-BOX.

1,166,953.

Specification of Letters Patent.

Patented Jan. 4, 1916.

Application filed April 30, 1915. Serial No. 24,859.

To all whom it may concern:

Be it known that I, CHARLES W. WALLER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Phonograph Sound-Boxes, of which the following is a specification.

This invention relates to sound reproducing boxes for use in connection with sound-recording and reproducing machines, and it is to be understood that the invention is adapted for any purposes for which it is found applicable, and the object thereof is to provide a sound box for phonographs, graphophones or the like, whereby an improved character of sound is produced and in which the vibrations of great frequency will be absorbed or eliminated to remove the objectionable squeaks and similar metallic or foreign sounds.

Another object of the invention is to provide a sound box which shall be simple in construction and inexpensive to manufacture, and in which the diaphragm and most of the stylus-arm may be entirely inclosed.

A further object of the invention is to provide a sound box in which the body, stylus head and etc. may be constructed of sheet metal, and the diaphragm of cork, or the like, if desired.

A still further object is to provide a sound box which will prevent the sound waves from escaping into the air from the outside or inoperative side of the diaphragm.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown the preferred embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the claims hereunto appended.

Referring to the drawings, wherein like reference numerals indicate similar parts in the several views, Figure 1 is a vertical sectional view of a sound box in accordance with this invention, taken on lines 2—2 and 3—3 of Figs. 2 and 3 respectively, looking in the direction of the arrows; Fig. 2 is a front view of Fig. 1; Fig. 3 is a rear view

of the same, showing a portion cut away for the purpose of a clearer illustration of the parts, and looking in the direction of arrow A in Fig. 1; Fig. 4 is a top view, partly in section, of the stylus head and support therefor, taken on line 4—4 of Fig. 1 and looking in the direction of arrow B; and Fig. 5 is a vertical sectional view of a section of a modified form of diaphragm.

Referring to the drawings, the body portion of the sound box 1 is formed of two oppositely disposed sections, 2, 3, the latter being preferably concavo-convex shaped, and the former being preferably formed into a concavo-convex ring 4 provided with a central neck 5, the said neck having a sound passage 6. The peripheries of the said sections 2, 3 are provided with flat circular portions 7, 8, the outer edge of which is preferably bent inwardly to form flanges 9, 10 respectively. The inside of these flat portions and flanges serve to hold in place elastic or flexible washers or gaskets 11, 12 between which a diaphragm 13, preferably of cork or the like, is held in place, the screws 14 serving to retain the several parts in place and to regulate the degree of pressure between the washers 11 and 12 and the diaphragm.

The employment of the cork diaphragm will eliminate the objectionable squeaks and similar metallic or foreign sounds and will make it possible to construct sound boxes of large dimensions, and it is to be understood that when a cork diaphragm is employed, the washers 11 and 12 may, if desired, be entirely eliminated.

To improve the character of sound, absorb or eliminate the vibrations of great frequency, and to remove the objectionable squeaks and similar metallic or foreign sounds, when a diaphragm of other suitable material is employed, such as, for instance, mica, the diaphragm is preferably provided with one or more weights, in the present instance in the form of twin rings 15, of any suitable material, preferably a non-resilient or non-sound-conducting material, such as, for instance, lead or solder. These rings may be joined together and fastened to the diaphragm by means of pins or bolts 16 passing through the diaphragm.

I have made practical tests with a sound box provided with a cork diaphragm and

have found that all objectionable squeaks and similar metallic or foreign sounds have been eliminated entirely by the use of the said cork diaphragm, and that the tones are
 5 clear and natural, producing a rich mellow tone, also that the soft tones or sound colors are clearly and naturally brought out. Many of these soft tones or sound colors have heretofore been completely drowned
 10 out or obliterated by the use of diaphragms of mica or other materials, since such diaphragms produce, more or less, objectionable squeaks and similar metallic or foreign sounds, whereas a cork diaphragm will produce none of these objectionable sounds, for
 15 the reason that no metallic or foreign sounds will emanate from cork, and for the reason that cork is not as hard as mica. Also, cork is capable of vibrating only as it
 20 is forced to vibrate by the lateral movement of the stylus arm, thereby causing only such sounds as the record will give out through the stylus.

A stylus arm 17, preferably of sheet metal,
 25 has its upper end twisted at a right angle and secured to the diaphragm by means of a small screw 18, the lower end of said stylus arm being bent to form a stylus head 19, the said stylus head having four sides or walls
 30 20, 21, 22 and 23, the wall 22 being provided with rivets 24 which pass through holes or openings in the end of the wall 23, thus forming a strong combined stylus head and arm of sheet metal. The said stylus
 35 head is also provided with a threaded opening in the wall 21 through which a screw 25 on the thumb-disk 26 is passed. A pin or bolt 27 provided with a head 28 is passed through a smooth opening in the wall 23, the
 40 said bolt being joined to the screw 25, thus providing means for holding the stylus 29 securely in place, the head 28 on the bolt 27 preventing the screw 25 from being turned completely out of the stylus head and there-
 45 by probably lost.

In order to prevent the stylus from moving too far upwardly in the stylus head, a small portion of the wall 23 is bent inwardly so as to form a stop 29', against which the
 50 top end of the stylus 29 abuts. The said stylus head 19 is also provided with elastic members 30 and 31, preferably of rubber or felt, located next to the walls 20 and 22 respectively, through which pass fingers 32
 55 and 33 respectively, the said members acting to assist in regulating the degree of pressure between the end portions 34 and 35 and the stylus head.

The sound box section 3 is provided at its
 60 lower edge with the pair of downwardly and outwardly extending end portions 34 and 35, through which pass the fingers 32 and 33, forming in effect a hinge and movably connecting the said section with the said
 65 stylus arm and head, thereby allowing lat-

eral movement of the said stylus, stylus arm and head to vibrate the diaphragm. In order to regulate and adjust the lateral movement of the said stylus, stylus head and arm, the said end portions 34 and 35 are provided
 70 with threaded and unthreaded openings, respectively, through which is screwed and passed, respectively, a screw 36.

To allow the section 3 to be put into place and to allow lateral movement of the stylus
 75 arm 17, a vertical elongated opening or slot 37 is provided in the lower portion of the said section 3, and this opening may, if desired to absolutely inclose all sounds between the section 3 and the diaphragm, be
 80 entirely covered or closed by any suitable flexible or yieldable material, not shown.

If desired, the modified form of twin rings shown in Fig. 5 may be employed, instead
 85 of the form shown in Figs. 1 and 3, in which 38 is the diaphragm, 39 the twin rings of any suitable material, preferably a non-resilient or non-sound-conducting material, such as, for instance, lead or solder. The
 90 said diaphragm and twin rings are fastened together by means of screws 40.

I wish it understood that any suitable material may be employed in the manufacture of the said invention, but I prefer to employ
 95 a non-resilient or non-sound-conducting material in the manufacture of the sections 2 and 3 and the twin rings 15 or 39, as the case may be. I also wish it understood that the diaphragm 13 or 38, as the case may be,
 100 may be, if desired, made or molded in one piece, of any suitable material, or made of cork or the like, instead of as shown and described, and that the twin rings may, if desired, be eliminated entirely.

What I claim is—

1. In a sound box, the combination of a
 105 diaphragm, a covering for the outside or inoperative side of the diaphragm, the lower portion being provided with an opening, a stylus arm passing through said opening,
 110 and a yieldable pastelike or jellylike material closing said opening between said covering and stylus arm, whereby the sounds from the outside or inoperative side of the diaphragm will be prevented from reaching
 115 the outside air.

2. In a sound box, a casing, a pair of
 120 downwardly extending end portions formed on said casing, a stylus arm and head, a piece of flexible material between each of said end portions and stylus head, said stylus head having fingers passing through
 125 openings in said end portions, and a screw passing through said end portions, whereby the degree of pressure may be regulated between said stylus head, flexible material and end portions.

3. In a sound box, a stylus head having
 130 a front, rear, and side walls, said front wall having a threaded opening, said rear wall

having a smooth opening, and a thumb
screw provided with a threaded and un-
threaded portion, said threaded and un-
threaded portions being inserted in said
5 threaded and smooth openings, respectively,
and said unthreaded portion having its end
provided with a head.

In testimony whereof I have hereunto set
my hand in the presence of two subscribing
witnesses.

CHARLES W. WALLER.

Witnesses:

JENNIE V. BERGLAND,
C. A. WALLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

PHONOGRAPH PATENT.

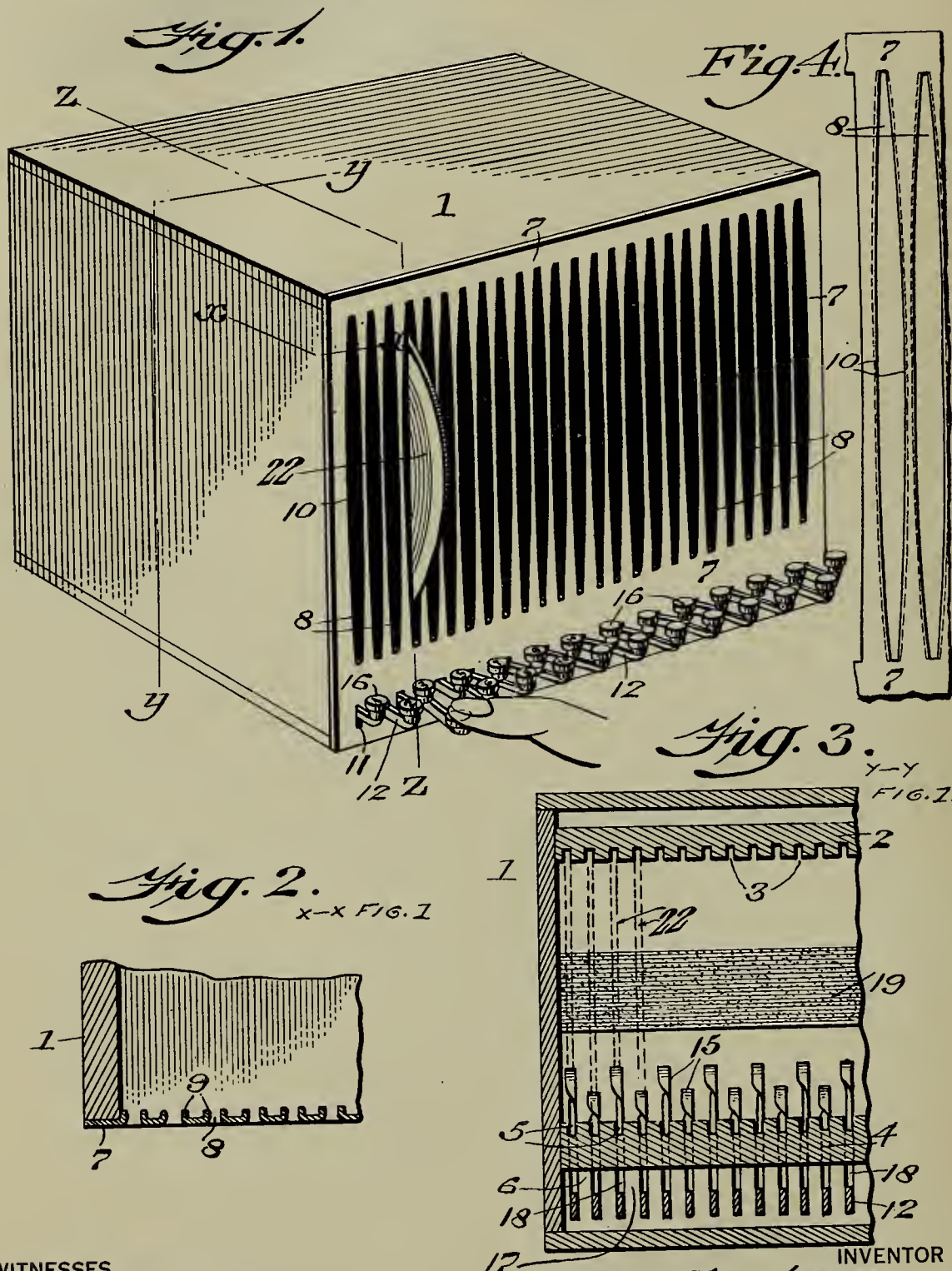
1,167,063

PHONOGRAPHIC DISK RECORD CABINET,
1,167,063-----A. H. Haag,
Patented-January 4th, 1916.
Filed-April 22nd, 1915.

A. H. HAAG.
 PHONOGRAPHIC DISK RECORD CABINET.
 APPLICATION FILED APR. 22, 1915.

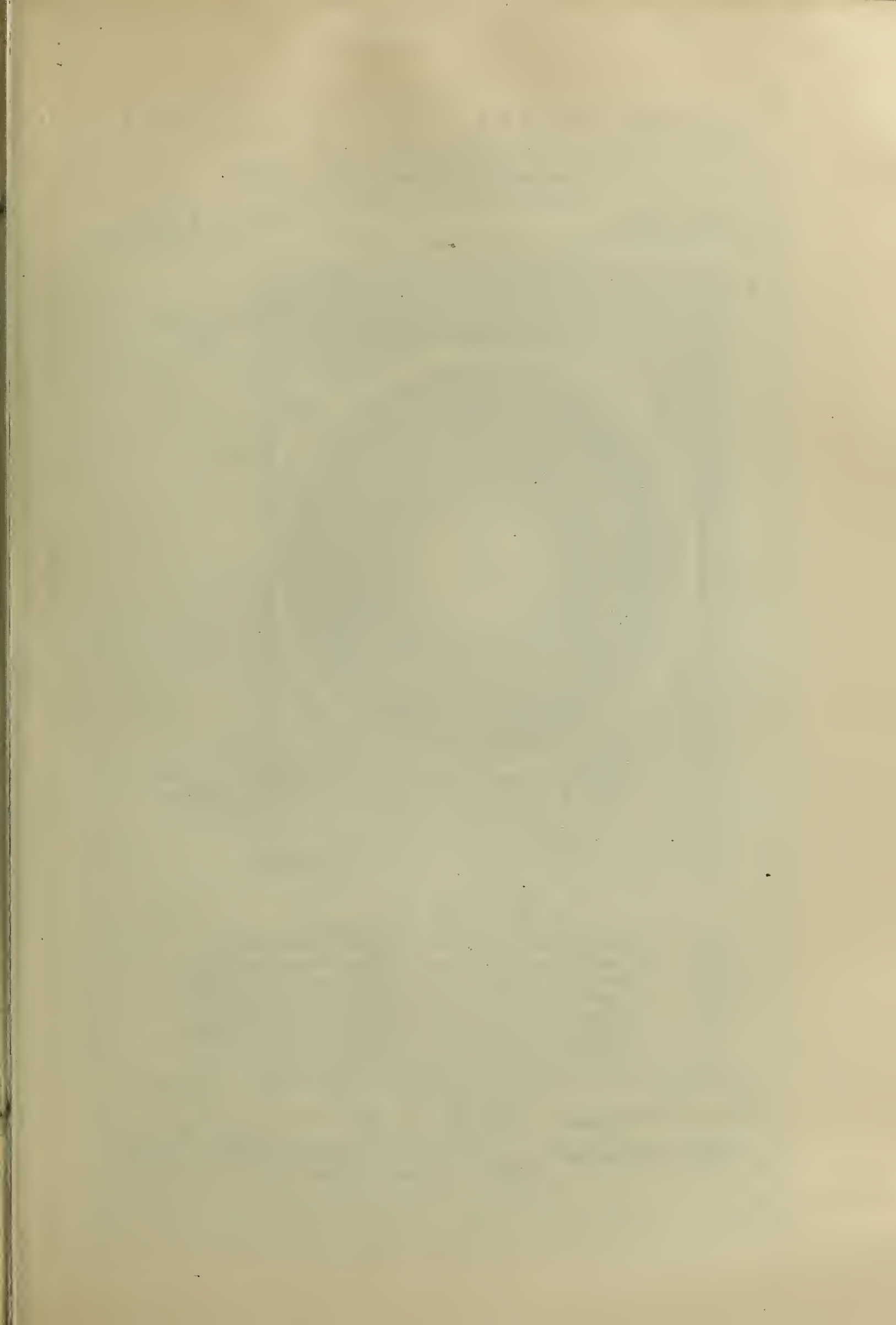
1,167,063.

Patented Jan. 4, 1916.
 2 SHEETS—SHEET 1.



WITNESSES
H. E. Dieterich
P. F. Nagle

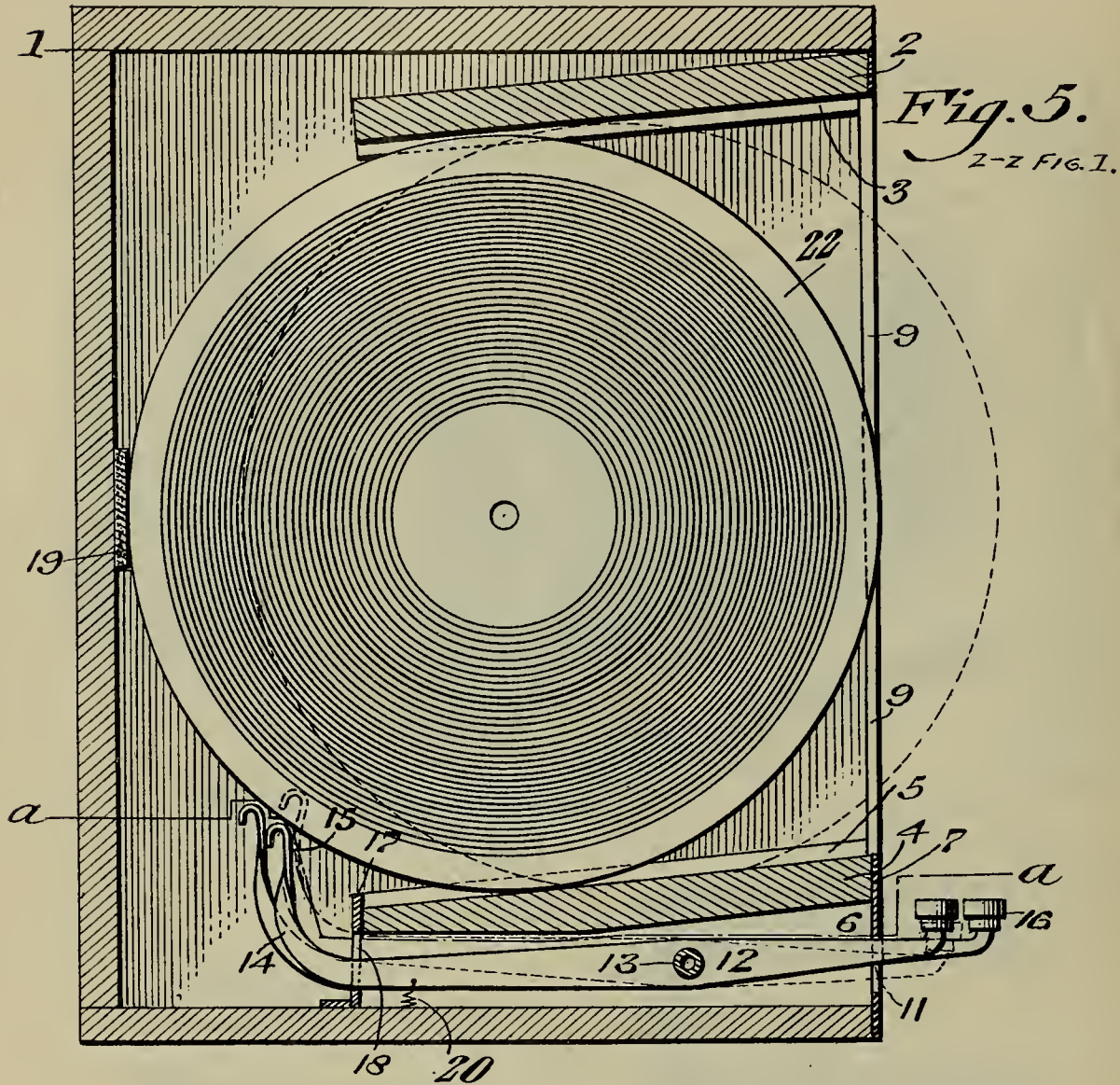
INVENTOR
Alfred H. Haag
 BY *Hedersheim Gaitbants*
 ATTORNEYS



A. H. HAAG.
 PHONOGRAPHIC DISK RECORD CABINET.
 APPLICATION FILED APR. 22, 1915.

1,167,063.

Patented Jan. 4, 1916.
 2 SHEETS—SHEET 2.



WITNESSES

P. F. Nagle.

H. E. Dieterich

INVENTOR
 Alfred H. Haag.
 BY Widerheim & Fairbanks
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Fig. 7.



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ALFRED H. HAAG, OF NEWPORT NEWS, VIRGINIA.

PHONOGRAPHIC-DISK-RECORD CABINET.

1,167,063.

Specification of Letters Patent.

Patented Jan. 4, 1916.

Application filed April 22, 1915. Serial No. 23,022.

To all whom it may concern:

Be it known that I, ALFRED H. HAAG, a citizen of the United States, residing at Newport News, county of Warwick, State of Virginia, have invented a new and useful Phonographic-Disk-Record Cabinet, of which the following is a specification.

My invention relates to a new and useful phonographic disk record cabinet and consists of a novel device or container for storing or housing disk records when the same are not in use and of novel ejector mechanism and its adjuncts which is simple in construction, efficient in operation and of durable construction.

It further consists of a novel front plate for the cabinet having a series of slots therein for the insertion or removal of the records and by means of which the latter are guided in their movement while their faces and the grooves therein are prevented from contact with the walls of the slots.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings a preferred embodiment which is preferred by me, since the same will give in practice satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 is a perspective view of a cabinet embodying my invention. Fig. 2 is a sectional view on line $x-x$, Fig. 1. Fig. 3 is a sectional view on line $y-y$, Fig. 1. Fig. 4 is a front elevation of a portion of the front plate on an enlarged scale. Fig. 5 is a sectional view on line $z-z$, Fig. 1. Fig. 6 is a sectional view on line $a-a$, Fig. 5. Fig. 7 represents in detached position a side elevation of a modified construction which I may employ.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—1 designates a cabinet of any suitable size and shape which is provided at a suitable point with an upper, preferably inclined strip 2, having suitable grooves 3 therein forming the upper tracks and with a lower preferably inclined

strip 4 having grooves 5 therein, which are in alinement with the grooves of the upper strip 2, forming the lower track. The strips or tracks are supported in any suitable or desired manner within the casing in the present instance being in suitable inclined position, so that when the record 22 is inserted in the cabinet it will at once roll into the desired position. The lower strip or track is spaced from the bottom of the casing in order to form a chamber 6 for the ejecting arms, as will be hereinafter described.

7 designates a front plate connected in any suitable manner with the casing 1 and which plate is preferably formed of sheet metal. A series of slots 8 are formed in the said front plate, which are adapted to aline with the upper and lower tracks in order to permit of the insertion and removal of the disk record. The edges of the metal at the slots are preferably bent inwardly to form stiffening flanges 9, as will be best understood from Fig. 2, and in order to provide a bearing surface as a guide for the record disks as they are inserted and removed, whereby no sharp edge of the metal contacts with the record or the grooves therein.

As will be noted, more particularly from Fig. 4, the distance between the walls of the slots at the center is greater than at the upper and lower portions, in order that these upper and lower portions will serve as guides for the records 22, whereby the face of the records and the grooves therein will be prevented from coming in contact with the walls of the slots, as will be evident. The walls of the slots 8 preferably converge from the center upwardly and downwardly so that the widest part 10 of said slots is at the center thereof. In the lower portion of the front plate 7 and at a point beneath the bottom tracks I provide a series of relatively short slots 11 through each of which extends an end of an ejector arm or lever 12. The arms 12 are fulcrumed or pivotally mounted within the casing upon a tube or rod 13, which extends laterally across the casing 1 in the chamber 6 and is situated out of alinement with the center of the records 22 when in their rearmost position in the tracks and I preferably locate the rod forwardly thereof, so that the inner end of each of the ejector levers 12 will be normally in lowered position and will return thereto after being actuated, by reason of its weight or the action of gravity.

Suitable spacing members may be mounted upon the tube or rod 13 intermediately of the ejector levers 12 in order to hold the same in proper spaced relation with respect to each other.

The inner terminal 14 of each arm or lever 12 is deflected upwardly and is normally juxtaposed to and in alinement with the edge of the record to be ejected, it being understood that there is an ejector arm or lever provided for each track or for each record.

As here shown, I have provided the end 14 of the arms 12 with a finger or engaging member 15, which may be suitably flattened or wider than the arms or levers 12 in order to suitably engage with the edge of the record. The ends of the ejector arm or lever which extends forwardly of the cabinet are provided with the finger pieces 16 for ease of actuation. Suitable means is provided for guiding the inner end of the arms or levers 12 and as here shown I provide a plate 17 mounted within the casing having a series of slots 18 alining with the smaller slots 11 of the front plate 7 and through each of said slots 18 the inner end of one of the arms or levers 12 moves and is guided.

The operation of the parts will be readily apparent. The records 22 having been inserted in the cabinet will automatically roll rearwardly and remain in their rearmost position, resting against a pad 19 carried by the rear wall of the cabinet 1, the ejector arm for each record being normally in the position seen in Fig. 5. When it is desired to remove a record, by pressing upon the finger-piece 16 the terminal end of the proper ejector arm carried thereby, will engage with the desired record and propel the same forwardly beyond the front plate 7 whereupon it can be grasped by the operator. Upon releasing the finger-piece 16 the ejector arm drops to its normal position by reason of its weight or the influence of gravity. The slots 8 and the front plates 7 guide the records during their insertion and removal, while the enlarged space between the walls of the slots at the center prevents the face of the record from being injured.

It will be apparent from the foregoing that my novel construction of disk record cabinet can be manufactured for the market in quantities very cheaply since the slots in the sheet metal front plate 7 can be readily punched therein by suitable machinery and the flanges 9 serve to reinforce and stiffen the walls of the slots, as is evident, so that the front plate 7 will be very rigid under all conditions and will not warp or change its shape. The ejector arms 12 can likewise be very cheaply manufactured out of sheet metal and since the same are preferably made throughout of one piece and the terminal or finger member 15 is integral therewith, the cost of production is greatly sim-

plified, and it will be further apparent that I have entirely dispensed with springs, elbow levers, links and other similar mechanisms which are usually employed in devices of this character.

The finger pieces 16 are preferably arranged in staggered order, as will be apparent from Figs. 1 and 6, and can be provided with suitable insignia or numerals indicative of the record which it is desired to withdraw from the cabinet and the ejector arms 12 carrying said finger pieces are fulcrumed in position by merely slipping the tube or rod 13 through the same after said arms have been assembled in the chamber 6. By locating the pivotal point or fulcrum of said arms 12 to one side of the center of gravity, as will be understood in Figs. 5 and 6, it will be apparent that after a record has been ejected and the finger removed from the finger piece 16, the arm 12 will automatically drop into its normal position by reason of gravity, so that there is no necessity for the employment of springs, links or other extraneous devices, in order to restore the ejector arms to normal or operative position.

The body of the cabinet 1 can be made of any suitable material as can also the upper and lower strips 2 and 4 and it will of course be apparent that said strips and the top, sides and rear wall of the cabinet, as well as the front plate 7, can be held in assembled position by any suitable means, as will be apparent to those skilled in the art.

It will be apparent that the walls of the slots 8 instead of being curved, may be composed of upwardly diverging straight walls, and downwardly diverging straight walls, which may meet at about the center of the face plate 7, whereby said slots will be widest at about the middle of their length, and it will be apparent that if desired the slots may have parallel walls, without departing from the spirit of my invention, and the reinforcing or stiffening flanges 9 may be omitted, if desired, although in practice I prefer to employ the same.

It will be understood that the arms 12 are loosely mounted upon the rod or tube 13, so that they will rock freely thereon, so that the inner ends thereof will drop by the action of gravity, and if desired, said inner ends at about the point 14 may be weighted, or I may employ the spring or equivalent tension devices 20 to effect the restoration of the arms 12 to their lowest position, as will be understood from Fig. 5, the employment of such springs, however, being optional, as it will be evident that my device is effective and operative without such springs 20.

In the construction seen in Fig. 7, the

upper end of the terminal 14 may be reduced in size and have a rubber or other cap 21 thereon, if desired, to impact with the record or disk 22, whereby the latter can be readily propelled from the exterior of the casing.

It will be apparent that in practice I may, if desired, construct the upper and lower strips 2 and 4 of metal having the grooves 3 and 5 respectively therein formed as corrugations in the metal, which can be readily effected by rolling, pressing or any other suitable means, as will be apparent to those skilled in the art, and it will furthermore be apparent that if desired, the top, bottom, sides and rear wall of the cabinet can also be composed of thin sheet metal without departing from the spirit of my invention.

The holes in the arms 12 through which the tube or rod 13 passes, can obviously be punched therein simultaneously with the punching of said arms.

It will now be apparent that I have devised a novel and useful construction of a phonographic disk record cabinet which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have, in the present instance, shown and described a preferred embodiment thereof which will be found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A phonographic disk record cabinet, comprising a casing provided with tracks for the reception of the disk records, a front plate having slots in alinement with said tracks to permit the insertion and removal of the records and a plurality of one piece arms each of which is pivotally mounted in suitable relation to its superimposed track, with its fulcrum in advance of its center of gravity and the center of its record when the latter is in its rearmost position whereby each of said arms drops by gravity upon being released and each arm having one end projecting forwardly through its slot in said plate and its opposite inner terminal extended upwardly and juxtaposed to and in alinement with the record to be ejected.

2. A phonographic disk record cabinet, comprising a casing provided with upper and lower tracks for the reception of the disk records, a front plate provided with a series of slots, a plurality of arms each having an end projecting through one of said slots, a rod suitably supported upon a

fulcrum within the casing beneath the lower tracks and in advance of its center of gravity and the center of the records and upon which fulcrum said arms are pivoted whereby said arms drop by gravity upon being released and a rear plate within the casing having a series of alining slots through each of which one of the arms extends and is guided, the inner terminal of each of said arms being deflected upwardly and juxtaposed to and in alinement with the record to be ejected.

3. A phonographic disk record cabinet, comprising a casing provided with a plurality of tracks for the reception of the disk records, a front plate having slots in alinement with said tracks, the edges of the metal at the slots being bent inwardly to form stiffening flanges, and the distance between the walls of the slots at their centers being greater than at the upper and lower portions, and means for ejecting a record from said tracks.

4. A phonographic disk record cabinet, comprising a casing provided with lower, inclined tracks for the reception of the disk records, and a plurality of unitary ejector levers, each of which is pivotally mounted below said tracks, and each of said levers having its fulcrum in advance of its center of gravity, whereby said ejector levers drop by gravity upon being released, and each of said levers having one end projecting forwardly from said casing for convenient manipulation and having its opposite inner rear terminal deflected toward and juxtaposed to the record to be ejected.

5. A phonographic disk record cabinet, comprising a casing provided with lower, inclined tracks for the reception of the disk records, and a plurality of unitary ejector levers, each of which is pivotally mounted below said tracks, and each of said levers having its fulcrum in advance of its center of gravity, whereby said ejector levers drop by gravity upon being released, and each of said levers having one end projecting forwardly from said casing for convenient manipulation and having its opposite inner rear terminal deflected toward and juxtaposed to the record to be ejected, the front portion of said casing being provided with a plurality of stationary slots which are in alinement with the record tracks, the distance between the walls of the slots at their centers being greater than at the upper and lower portions of said slots, whereby marring of the record grooves is prevented.

6. In a phonographic disk record cabinet, supporting and guiding means for closely related parallel disk records, and a plurality of unitary, independently operable, oscillatory levers, each of which is pivotally mounted below said supporting and guiding means, and each of said levers hav-

ing one end projecting from said cabinet for convenient manipulation and having its opposite rear terminal deflected toward and juxtaposed to the record to be ejected, said rear terminal being retained normally in depressed position and adapted to be elevated into contact with the juxtaposed rec-

ord upon the depression of the outer end of said lever.

ALFRED H. HAAG.

Witnesses:

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H. S. FAIRBANKS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

1,167,206.

----- CABINET FOR SOUND RECORDS,
1,167,206-----J. B. Ogden,
Patented-January 4th, 1916.
Filed-October 12th, 1914.

J. B. OGDEN.
CABINET FOR SOUND RECORDS.
APPLICATION FILED OCT. 12, 1914.

1,167,206.

Patented Jan. 4, 1916.

Fig. 1.

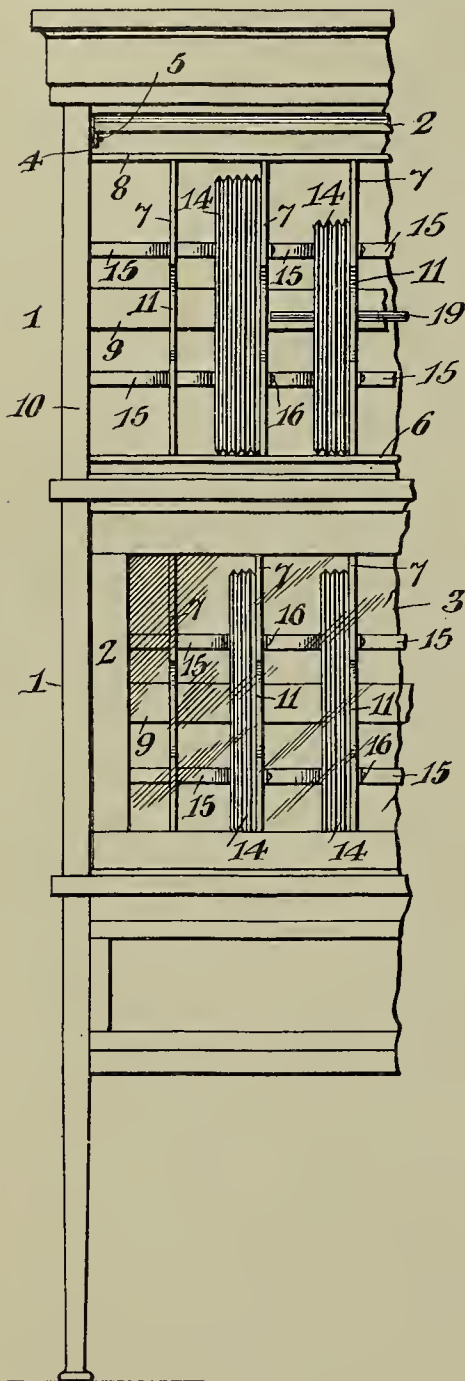


Fig. 2.

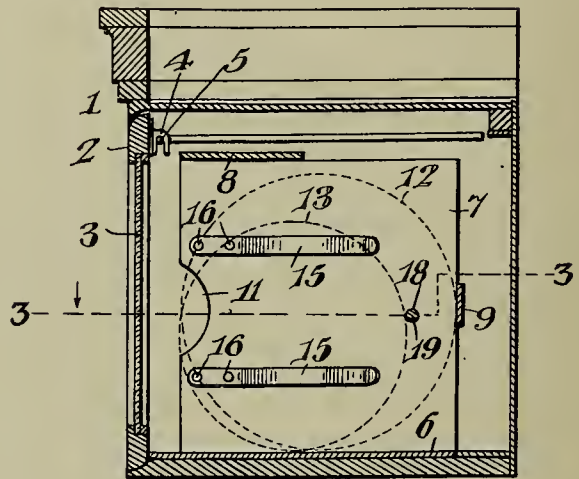
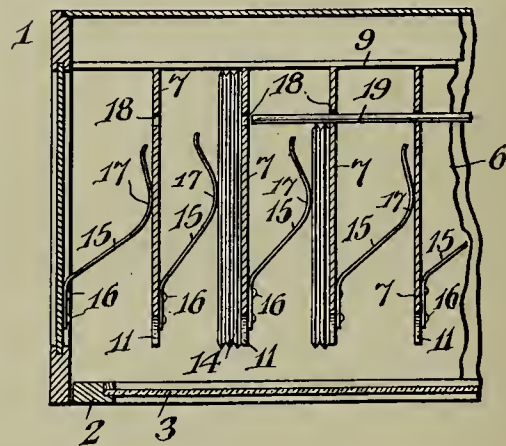


Fig. 3.



WITNESSES

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CABINET FOR SOUND-RECORDS.

1,167,206.

Specification of Letters Patent.

Patented Jan. 4, 1916.

Application filed October 12, 1914. Serial No. 866,347.

To all whom it may concern:

Be it known that I, JOHN B. OGDEN, a citizen of the United States, residing at Lynchburg, in the county of Campbell and State of Virginia, have invented a new and useful Cabinet for Sound-Records, of which the following is a specification.

This invention has reference to cabinets for sound records, and is designed particularly for the storage of disk sound records with the disks setting on edge in such manner that liability of warping of the disks is obviated.

It has heretofore been the custom to store disk sound records either on edge or lying flat one on the other, but both of these schemes while advantageous in some respects, have disadvantages in other respects. In the customary manner of storing disk sound records on edge a considerable number of records are stored in a single compartment, and unless the compartment is practically full and so maintained the record disks are liable to slant and then they warp more or less. This warping, of course, is detrimental, and in order to avoid so prevalent a deleterious condition it has been proposed to stack the disk records flat, but while the flat or horizontal position of the records prevents warping, it becomes difficult to remove any of the records except those at or near the top of the stack.

With the present invention the records are stored in the upright position and automatically maintain such position whether there be but one record in a compartment or the compartment be substantially full of records, while there is no interference with the ready removal of any desired record in a compartment. Since the record disks are maintained in the upright position under some lateral pressure at considerably spaced points, there is no tendency for the record disks to warp and any chosen one of a group of disks in a compartment may be removed without disturbing the others or interfering with the maintenance of the true upright position.

In a cabinet constructed in accordance with the present invention there are numerous compartments provided, and in each compartment broad leaf springs are mounted readily yieldable to the introduction of the record or record disk and its re-

moval from the compartment, while these springs are so arranged as to have a normal tendency to extend wholly across the particular compartment, but may be moved to the same side of the compartment from which they extend. By this means the springs which are spaced apart in the direction of the height of the compartment readily hold a single record disk flat against the opposite wall of the compartment, or these springs will hold as many disks as the compartment will hold at the same time maintaining the disks in the true upright position.

The invention contemplates the employment of a stop member which may be introduced, if desired, so that the compartments may be initially made to hold the larger record disks, namely, those twelve inches in diameter, or they may be made to hold the smaller record disks which are ten inches in diameter, and in each instance those edges of the disks presented toward the front of the cabinet are all in substantially the same upright plane extending transversely of the cabinet. This not only produces a neat appearance, but brings all the disks into position for being readily grasped in case it is desired to remove any one or more of the disks.

The invention will be best understood from a consideration of the following detailed description, taken in connection with the accompanying drawings forming a part of this specification, with the further understanding that while the drawings show a practical form of the invention, the latter is not confined to any strict conformity with the showing of the drawings, but may be changed and modified so long as such changes and modifications mark no material departure from the salient features of the invention.

In the drawings:—Figure 1 is a front elevation of a portion of a cabinet made in accordance with the present invention. Fig. 2 is a front to rear vertical section of a portion of the cabinet. Fig. 3 is a section on the line 3—3 of Fig. 2, showing some record disks in place.

For convenience of manufacture, transportation, and storage the cabinet may be made of sections, after the manner of the familiar sectional bookcase, but it is to be

understood that the cabinet may be made as a single piece of furniture with the sectional idea omitted. Since each section of the cabinet may be like the others, the description to follow will be limited to a description of one section. The cabinet, therefore, is made up of sections 1 each provided with a door 2, which may have a glass pane 3 and is usually so constructed. The door may be hung in the manner customary in sectional bookcases, that is, the door is suspended by a hook 4 upon a pivot pin 5 at each end, so that when the door is in the closed position it is pendently supported by the pins 5. When, however, it is desired to open the door it is swung upwardly around the pivot pins 5 and then moved inwardly until housed in the casing of the cabinet section. It is customary to provide such doors with means for facilitating the movements thereof, but as these means may follow the usual practice in sectional bookcases, no attempt has been made to show them.

Adapted to the interior of each section of the cabinet is a compartment structure consisting of a bottom piece 6, spaced partitions 7 carried thereby, a connecting top piece 8, and a back connecting piece 9. The compartment structure may be arranged for ready insertion in one of the cabinet sections or removal therefrom, or it may be fixedly built into the section. Each partition 7 is suitably spaced from its neighbors, and the end partitions are suitably spaced from the end walls of the cabinet, one such end wall being indicated at 10. These partitions each have what constitutes the front edge cut out or notched, as indicated at 11, for permitting access to the record disks, such as indicated at 12 and 13, respectively, in Fig. 2, with or without the customary envelopes indicated at 14 in Figs. 1 and 3, since the front or exposed edges of these disks are all in the same vertical plane transverse of the cabinet and close to the partitions.

Secured to each partition 7 near the front edge thereof and above and below the notch are flat or leaf springs 15, the fastening devices indicated at 16 traversing these springs near one end, and from this point the springs are bent away from the respective partition toward the next partition in order, and then returned for a portion of the distance by a gentle curve indicated at 17, so that there is always left a short space between the free extremity of a spring 15 and the partition toward which it tends. Similar springs are attached to one end 10 of the cabinet, and those of the last partition 7 in order to engage the other end of the cabinet, as will be readily understood, although this feature is not shown in the drawings.

Each partition 7 is provided with a passage 18 near its rear edge, and these pas-

sages are all in line, so as to be traversed by a rod 19.

Since under present conditions the largest sound record disks on the market are twelve inches in diameter, the cabinet, and especially the compartment portion thereof, is so proportioned that a twelve inch sound record disk indicated at 12 in Fig. 2 when placed in the cabinet either with or without the inclosing envelop 14 will engage the rear strip 9, at which time the front of the record disk or the envelop carrying it is about coincident with the front edge of the partitions 7 defining the compartment in which the record disk has been placed. The insertion of such a disk, (and hereinafter the term disk will be used to mean the disk without the envelop or the disk with the envelop, as the case may be,) causes a corresponding compression of the springs 15 of the compartment by engaging the curved portion 17 thereof. The normal tension of the springs 15 is such that the inserted disk is forced flat against the corresponding wall of the next partition 7 in order, and these springs engaging the disk on opposite sides of its center along an upright line which may correspond quite closely to the upright diameter of the disk, hold the latter at spaced points. When other disks are inserted in the same compartment, the springs are still further compressed and therefore hold the disks with added force, which however is advantageous since as the number of disks inserted increases the tendency of these disks to fall over correspondingly increases. The insertion of disks may continue until the compartment is full, or may stop at any point when the spaced springs bearing at correspondingly spaced points on the disks with which they engage force the disks evenly against the other wall of the compartment, but whatever be the number of disks in the compartment they are always held in face to face contact and against the opposite wall of the compartment from the springs, wherefore there is no opportunity or tendency to warp, since the disks are invariably upright upon the edges supporting them. If it be desired to store ten inch sound record disks in the cabinet, the rod 19 is inserted through the passages 18, and then serves as a stop limiting the extent of insertion of the disks in the compartments. This rod is so placed that the front edge of a ten inch disk occupies about the same position as is occupied by a twelve inch disk when abutting against the stop member 9. By using rods 19 of less length than the full width of the cabinet some of the compartments in the same horizontal row may be employed for the storage of twelve inch disks and other compartments for the storage of ten inch disks. The two sizes of sound record disks given are those almost universally in use, but if

it be desired to accommodate disks of other sizes, such as seven or eight inch disks, which have been made in the past, it is only necessary to provide other holes 18 properly located. In a cabinet designed particularly for ten and twelve inch disks the springs 15 are so located that they will engage disks of either size at spaced points above and below the center of the disk, thus holding the disks flat against that wall of a compartment opposite the wall carrying the springs 15.

As practically all sound record disks are now furnished with protecting envelopes, the springs may be made to engage directly against the envelop of the disk next to the springs and the insertion into or withdrawal of disks from the compartment is not at all detrimental to the disks because they are protected by their inclosing envelopes and the movement of the broad flat springs along such envelopes is harmless, such movement occurring as the springs approach the opposite wall of the compartment or recede therefrom. Moreover, the springs are readily located so as to avoid the customary label displaying opening provided at the centers of the protecting envelopes.

In Fig. 1 there is shown a cabinet formed of two superposed members with the upper member having the protecting door open and two of the compartments provided with twelve and ten inch record disks, respectively. The lower member is shown with two compartments containing twelve inch disks, each of the lower compartments having a less number of disks therein than the corresponding upper compartments. In Fig. 2 the disks are omitted, but their positions are indicated in dotted lines, one showing a twelve inch disk and the other a ten inch disk. In Fig. 3 two adjacent compartments are shown with twelve and ten inch disks, respectively, and as the number of disks in the two compartments of Fig. 3 differ, the springs 15 are differently compressed to a corresponding degree. In Figs. 1 and 3 the rod 19 is shown as traversing a portion only of the number of compartments there displayed, but it will be understood that the rod may extend throughout all the compartments, so that the particular cabinet member may be then limited to ten inch disks, or the rod may be omitted entirely, in which case the cabinet member would be adapted to contain twelve inch disks throughout all its compartments.

The record holding or filing cabinet of the present invention is particularly useful in salesrooms, whereby each compartment may be reserved for a group of records of one number or composition, or may contain two or more such groups each made up of an appropriate number of disks. The cabinet has the advantage of convenience in the storage of records with protection from dust

and harm, as well as providing an attractive piece of furniture for the salesroom. The cabinet has also the further advantage of maintaining all records whether many or few in number in a practically true upright position, so that all tendency of the record to warp because of unequal support and the tilting of the record is avoided, while each record is readily accessible at all times, irrespective of the presence of other records, and the inconvenience incident to piling records one on top of the other is wholly obviated.

What is claimed is:—

1. A storage cabinet for sound record disks having a series of compartments therein formed by a plurality of upright partitions, the compartments being open at the front, and flat leaf springs secured to the partitions near the front thereof, said springs being bent outwardly and rearwardly toward the next adjacent partition and normally in contact therewith intermediate of their length, and thence curved away from the last mentioned partition, said springs being arranged in pairs in each compartment with one spring above and the other below the horizontal center of the compartment, whereby the records when inserted through the open front of the compartments are caused to strike the springs near their fastened ends, and when the records are in place the springs engage the records on the opposite sides of the horizontal diameter and substantially at the vertical diameter, so as to maintain the records on edge in an upright position and prevent warping.

2. A storage cabinet for sound record disks having a series of upright partitions, a bottom member carrying the partitions and a rear member connecting the partitions and serving as a stop, said partitions each carrying springs, each spring being connected at one end to the corresponding wall of a partition near the front edge, and having a normal tendency to engage the corresponding wall of the next partition in order, said partitions with their connecting parts and springs being bodily removable as a unit from and insertible into the cabinet.

3. A storage cabinet for sound record disks having a series of compartments therein provided with upright partitions and each compartment having flat leaf springs secured to one side wall of the compartment near the front end thereof and thence directed toward the other wall of the compartment and having the extremity curved away from said last-named wall, the springs in each compartment being arranged above and below the mid point of the height of the compartment, each compartment having its front to rear depth sufficient to accommodate a record disk of largest diameter and said compartments being also provided with readily removable stop means situated at a

distance from the front of the compartment corresponding to the diameter of a smaller disk than the first-named disk.

4. A storage cabinet for sound record disks having a series of upright partitions defining compartments with each compartment provided with leaf springs one above and the other below the middle of a record disk when lodged in the compartment, each spring being secured at one end to a respective wall of the compartment and having a normal tendency to engage the other wall thereof, the partition walls of the compartments being provided with stop means for record disks of a predetermined diameter and other stop means in the form of a removable rod, the partitions being provided with alined passages for the reception of the rod.

5. A storage cabinet for sound record disks having a series of upright partitions, a bottom member carrying the partitions, and a top member joining and spacing the partitions, together with a rear member connecting the partitions and serving as a stop member, the said partitions each carrying on one wall a set of leaf springs each connected at one end to the corresponding wall of a partition near the front edge of the partition and having a normal tendency to engage the corresponding wall of the next partition in order with the free rear end of the spring bent backward toward the partition carrying

it, said partitions with their connecting parts and springs being bodily removable from and insertible into the cabinet.

6. A storage cabinet for sound record disks having a series of upright partitions, a bottom member carrying the partitions, and a top member joining and spacing the partitions, together with a rear member connecting the partitions and serving as a stop member, the said partitions each carrying on one wall a set of leaf springs each connected at one end to the corresponding wall of a partition near the front edge of the partition and having a normal tendency to engage the corresponding wall of the next partition in order with the free rear end of the spring bent back toward the partition carrying it, said partitions with their connecting parts and springs being bodily removable from and insertible into the cabinet, and said partitions having alined passages near their rear ends and a rod adapted to the passages and serving as a stop member for records of smaller diameter than those accommodated by the first-named stop member.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN BROWNING OGDEN.

Witnesses:

E. SINGLETON,
B. Y. CALVERT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

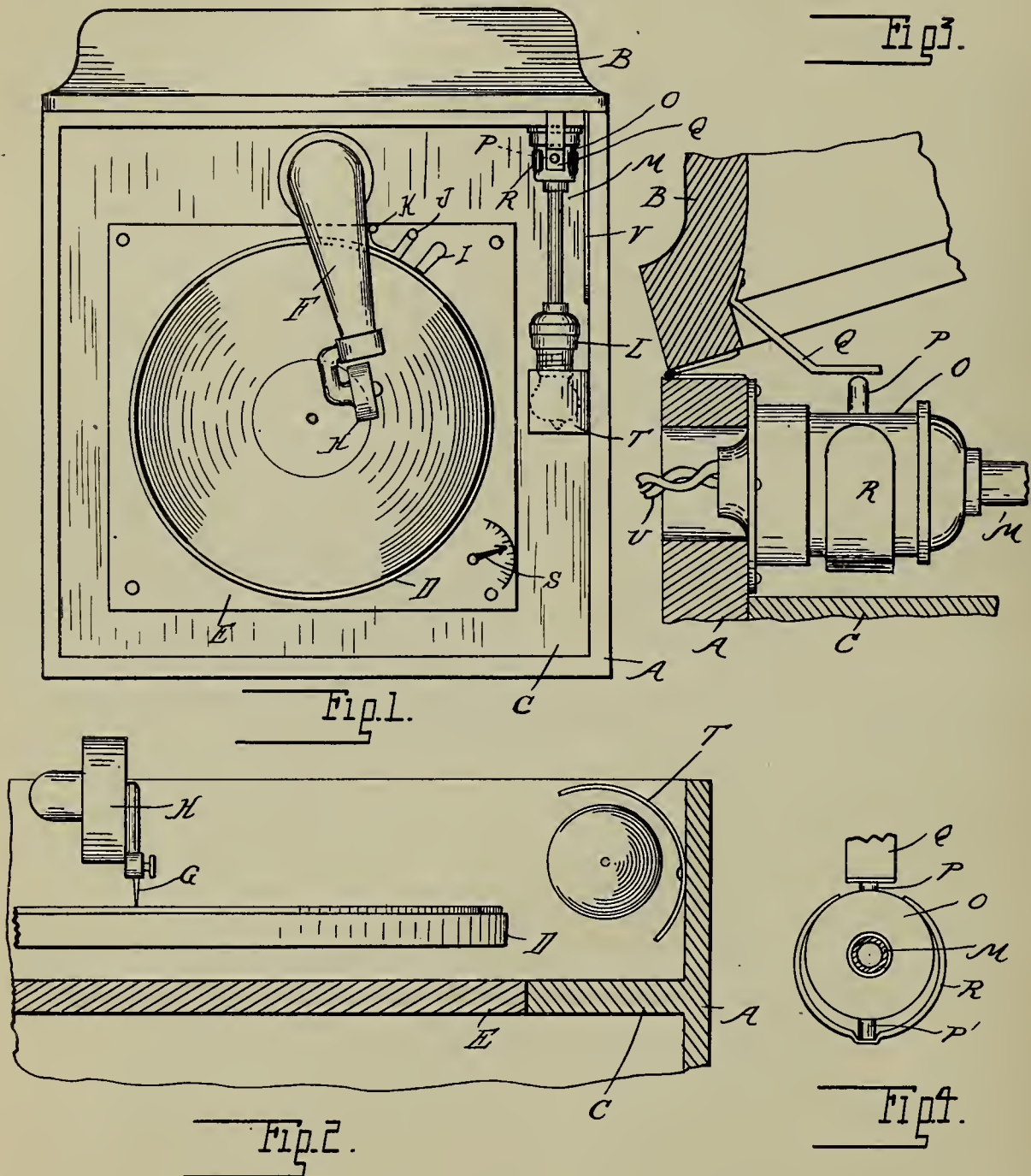
1,167,304.

AUTOMATIC LIGHTING ATTACHMENT FOR
PHONOGRAPHIC CABINETS,
1,167,304-----F. B. Johnson,
Patented-January 4th, 1916.
Filed-January 19th, 1915.

F. B. JOHNSON.
 AUTOMATIC LIGHTING ATTACHMENT FOR PHONOGRAPH CABINETS.
 APPLICATION FILED JAN. 19, 1915.

1,167,304.

Patented Jan. 4, 1916.



Witnesses

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AUTOMATIC LIGHTING ATTACHMENT FOR PHONOGRAPH-CABINETS.

1,167,304.

Specification of Letters Patent.

Patented Jan. 4, 1916.

Application filed January 19, 1915. Serial No. 3,112.

To all whom it may concern:

Be it known that I, FRANK B. JOHNSON, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Automatic Lighting Attachments for Phonograph-Cabinets, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to phonograph cabinets of that type in which the disk record is placed on a turntable within a casing having a hinged lid, said casing also containing the needle-holder, sound-box and swinging hollow arm for coöperation with the record. In the present state of the art it is usual to provide machines of this type with automatic stops which require a different setting for each individual record. It is also necessary in setting the stop to place the needle at the upper point in the record groove, and this is frequently difficult on account of the poor light. The turntable is usually mounted upon a removable board also carrying the motor, and in certain constructions this board is pivoted so that it may be reversed in position for oiling the motor. Still further these machines are usually provided with a speed adjustment which is mounted upon the same board and is provided with an index needle for setting.

It is the object of the present invention to provide an automatic light, which is turned on only when the lid is raised for the exchange of records and is cut off on the closing of the lid.

It is a further object to so construct and arrange the light and its operating mechanism as to brightly illuminate the portion of the record in which the needle is placed in setting the automatic stop; also to avoid interference with any part of the mechanism within the cabinet by the removal of the turntable and motor; and further to shield the light from the eyes of the operator and to illumine the speed regulator.

With these and other minor objects in view the invention comprises the construction as hereinafter set forth.

In the drawings: Figure 1 is a plan view of the cabinet, showing the lid in raised position; Fig. 2 is a transverse section showing the relation between the lamp and the needle and record in stop setting; Fig. 3 is a section showing the switch and connections

for automatically operating it upon the closing and opening of the lid; and Fig. 4 is a view at right angles to Fig. 3.

A is the cabinet which is provided with the usual hinged lid B and the horizontal shelf or partition C for dividing the space containing the turntable from the sound resonating box (not shown).

D is the turntable mounted upon a removable section E of the shelf C, which section also has mounted thereon the motor (not shown).

F is the hollow, swiveled arm, which conveys the sound from the needle G and diaphragm holder H to the sound box.

In the operation of this machine the arm F travels from the periphery of the record to the point of termination, which latter is at a variable distance from the center. The turntable is started by the release of the brake operated by a finger I, and is stopped by the tripping of this brake.

J is a trip which may be set in coöperation with a pin K on the arm F, so as to set the brake when said arm has reached a predetermined point in its movement.

To provide a light for the setting of this stop which will not interfere with the operating mechanism, I have arranged an electric lamp socket L at one side of the case and so as to clear the removable turntable and motor-holding board E. The electrical connections for this lamp extend to the back of the cabinet, and I preferably carry the socket upon a hollow or tubular arm M, which at its rear end is connected to an electric switch O secured to the rear wall of the cabinet. The switch is preferably of a type in which there are provided oppositely-extending pins or buttons P and P', one for closing the circuit and the other for opening the same. The circuit-opening pin is arranged at the top of the switch and is operated by an arm Q preferably a piece of spring metal secured to the hinged lid so as to press the pin as the lid is closed. To close the circuit, instead of positively actuating the switch by the movement of the lid, I preferably employ a spring R which resiliently presses against the circuit-closing pin P'. This, as shown in Fig. 4, may be formed by a segment of resilient metal embracing the switch casing O and expanded by the downward movement of the pin P when actuated by the depression of the pin P. Thus when the pressure is relieved from

the pin P the resiliency of the spring segment will press upward the pin P' and close the electric circuit.

In addition to illuminating the automatic stop-setting mechanism, the lamp is arranged to illuminate the speed regulator S, while a shield T which partially surrounds the lamp bulb will intercept the upward directed rays so as not to shine in the eyes of the operator.

The electric circuit may be closed by suitable connections with the cabinet, preferably formed by a flexible connector cord U extending from the rear of the cabinet. The arm M which supports the lamp socket is arranged adjacent to the brace V which automatically holds the lid B in raised position, but clearance is provided so as not to in any way interfere with the operation of this brace.

What I claim as my invention is:—

1. The combination with a phonograph cabinet, of a lamp for illuminating the same, comprising a laterally-extending arm, a lamp socket mounted at the outer end of said arm, a controlling switch secured to the inner end of said arm and attached to the rear wall of the cabinet, electrical connections to said switch and lamp, extending through the rear wall of the cabinet, and a

finger secured to the hinged lid for operating said switch.

2. The combination with a phonograph cabinet, of a lamp for illuminating the same, comprising a laterally extended arm, a lamp socket mounted at the outer end of said arm, a controlling switch secured to the inner end of said arm and attached to the rear wall of the cabinet, electrical connections to said lamp and switch, and means secured to the hinged lid for operating said switch.

3. The combination with a phonograph and a cabinet containing the same, having a hinged lid, of a lamp mounted substantially midway between the front and rear walls of the cabinet to illuminate portions of the phonograph, said lamp being supported from the rear wall of the cabinet, a reflector secured to a side wall of the cabinet to direct the lamp rays to the phonograph, a switch in the cabinet for controlling said lamp, and means carried by the cover for opening and closing said switch according as the lid is lowered or raised.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK B. JOHNSON.

Witnesses:

JAMES P. BARRY,
HENRI E. BOWMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

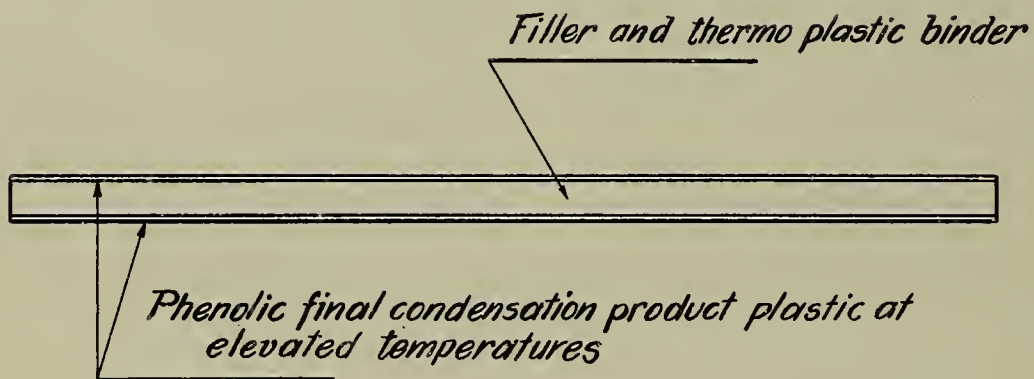
MOLDED ARTICLE,

1,167,468-----J. W. Aylsworth,
Patented- Jan. 11th, 1916.
Filed-Sept. 10, 1914.

J. W. AYLSWORTH.
MOLDED ARTICLE.
APPLICATION FILED SEPT. 10, 1914.

1,167,468.

Patented Jan. 11, 1916.



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Jonas W. Aylsworth
by Dyer and Holden
His Atty:

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MOLDED ARTICLE.

1,167,468.

Specification of Letters Patent.

Patented Jan. 11, 1916.

Original application filed January 30, 1912, Serial No. 674,289. Patented July 13, 1915, No. 1,146,391.

Divided and this application filed September 10, 1914. Serial No. 861,037.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Molded Articles, of which the following is a description.

My invention relates to molded objects, such as sound records, and more particularly to such molded objects as are formed by the method or process described in my application, Serial No. 674,289, filed January 30, 1912, of which this application is a division. The said process involves the formation of a surface layer of material upon the smooth polished surface of a metallic plate or other blank mold and the transfer of the same to the surface of the object to be coated under heat and pressure with the firm adhesion or welding of the surface veneer to the object. The surface layer thus formed has a smooth homogeneous surface free from air bubbles, dust particles and the like, and is of a material which is hard when cold, but sufficiently plastic when heated, to take a clear impression from a mold or die, such as a sound record matrix.

The principal object of my invention accordingly is the production of such molded articles as will be more fully described hereinafter.

My present invention is in part a continuation of my application Ser. No. 579,130, filed August 26, 1910, method of molding sound records and other objects.

In its preferred form, my process consists essentially in coating the surface of a blank mold or polished plate with a solution or fused film of ingredients, which, upon being heated, form a surface layer or veneer on the mold surface of a hard infusible, insoluble, phenolic condensation product containing plasticity ingredients, such that the veneer becomes sufficiently plastic upon being reheated to take an impression, as stated. The object to be surfaced is pressed into contact with this hardened veneer in the mold with application of heat sufficient to cause the object and the surface layer to become

firmly welded together, the molded object then being cooled and removed from the mold with the surface layer adhering thereto. The coated blank can then be heated and pressed in a sound record or other mold to receive the desired impression upon the surface thus formed. The process is not, however, limited to the use of phenolic condensation products, but may be practised with other substances having the desired properties, as will be described. For example, the surface veneer may be a lacquer composition of celluloid dissolved in a suitable solvent and the blank to which the same is transferred in the mold may consist of a gum-like binder and a suitable filler, such as wood flour.

Sound records and other objects having a surface layer are commonly made by forming the surface layer, placing the same upon the backing and then pressing the surface and backing together with sufficient heat to cause adhesion, the desired molded impression being formed at the same time. The advantages of first forming the surface layer upon a blank mold and then transferring the same directly from the mold surface to the backing, over the procedure referred to, are numerous. Where a thin surface layer of desired material, such as material suitable for forming sound records is made, it is usually impossible to handle the same and paste it to the backing without injury to the surface layer or film, because of the fact that the same is very thin and fragile. To overcome this difficulty, such films are often formed on or reinforced with paper or other fabric which is then cemented to the backing. The paper is comparatively rough and porous, and accordingly contains air bubbles and prevents the formation of the desired hard smooth surface upon the surface film when the latter is to receive a sound record or other delicate impression. By my process, no paper or other reinforcing means is necessary and the metal surface upon which the surface film is formed, can be coated with a film entirely free of air bubbles.

Another advantage over a process in which a paper strip or the like is used, is that the

difference of coefficients of expansion of the varnish film and the paper are such as will ultimately cause the film to crack or have its surface impaired when exposed to extreme
5 heat or cold, which difficulty is overcome by my invention.

In my process, the metal plate or blank mold can be highly finished and the film formed thereon will bear a replica of the
10 same high smooth finish and when this film is transferred in the mold to the backing, the surfaced article thus formed will still bear the same highly polished surface. By this process also the surface of the film,
15 which is subsequently to receive the sound record or other impression, is during the formation of the surface film, next to the metal surface of the blank mold and is accordingly protected at all stages of its formation and drying from dust and other im-
20 purities. The atmosphere in rooms where such work is carried on is always charged with dust particles and the smallest particle of dust adhering to the surface of a sound record for example, impairs the per-
25 fection of the surface of the sound record impressed thereon. Where varnished paper is used as a surface film, the latter is necessarily exposed to contamination from dust, lint, etc., at some stage of the drying op-
30 eration during which particles of such foreign matter will be cemented to the outer surface of the film. Furthermore, by my process, if the surface veneer is a hard infusible phenolic condensation product and
35 the backing contains rough particles or a fibrous filler, the backing being carefully made to have a substantially uniform thickness and density, the fibers or other rough
40 elements of the backing cannot be impressed through the surface film during subsequent pressing because of the hardness of the surface material used. If the surface layer is made of materials which are less
45 hard than that mentioned and the backing is of a varying thickness or density, some of the fibers or high spots of the backing are apt to be forced through the surface of the coated article in spots where the greatest
50 pressure occurs, thus impairing the perfection of the sound record or other impression made.

In practising the invention, the polished surface of a blank mold may be painted
55 with or dipped in a solution of the ingredients or the same may be applied to the surface of the mold by spraying in a uniform manner. The material applied to the blank surface may be a solution of a fusible
60 soluble phenolic condensation product, such as the phenol resin described in my application, Ser. No. 496,060, filed May 14, 1909, upon which United States Patent No. 1,102,630 has been granted, together with a

hardening agent therefor containing active
65 methylene (CH_2) groups, such as hexamethylene-tetra-amin, in a suitable solvent which may be either a volatile solvent, such as amyl alcohol, or a solid solvent, such as mono-nitro-naphthalene or other solvents
70 referred to in my application, Ser. No. 496,060 referred to, or penta-chloro-phenol or other solvents referred to in my application Ser. No. 604,982, filed January 27, 1911, plastic phenolic condensation products,
75 plastic phenolic condensation products, upon which United States Patent No. 1,046,137 has been granted. The veneer or coating formed upon the blank mold may be the enamel lacquer or varnish described in my
80 application Ser. No. 543,239, filed Feb. 11, 1910, upon which United States Patent No. 1,098,608 has been granted. If a volatile solvent is used, it should be one whose boiling point is higher than the temperature at
85 which it is desired to perform a final hardening reaction of the substance in solution into a refractory insoluble infusible condensation product. Preferably the veneer coating contains a solid solvent or plasticity in-
90 gredient, such as penta-chloro-phenol. Having coated the blank mold the same is dried, and heated sufficiently to cause the ingredients of the coating to react to form the final infusible insoluble refractory product
95 referred to. The article to be coated, such as a blank phonograph record, which is preferably made of a phenolic condensation product or a mixture of the same with an inert filling material, is then pressed in the
100 blank mold into contact with the surfacing layer formed in the blank mold as described, heat being applied sufficiently to cause the welding of the surface layer to the blank, and the transfer of the surface layer from
105 the blank mold to the blank or backing upon the cooling and withdrawal of the backing from the mold. In some cases it will be well to varnish the surface of the blank or back-
110 ing which is to be welded to the veneer film with some of the unhardened varnish before the backing is pressed into contact with the veneer to aid the adhesion of the two.

The coated articles, such as a blank phonograph record, which is thus formed with
115 a smooth hardened surface layer, may be then pressed into or against a heated phonograph record matrix or other mold, the blank also being heated if necessary. Because of the character of the surface layer
120 of the article and the presence therein of a plasticity component, such as described in my application Ser. No. 496,060, referred to, the sound record or other impression is formed in the surface thereof by the matrix
125 in much the same manner that a similar record or impression is formed upon a heated celluloid blank pressed into a mold. The

molded object thus formed is cooled and withdrawn from the mold.

As stated, the above described process may be carried out broadly with the use of other compositions than those described. Thus the veneer surface may be formed of celluloid dissolved in a suitable solvent, such as amyl acetate or alcohol and ether, and the blank or backing may be composed of a gum-like binder and a suitable filler such as wood flour or infusorial earth or a mixture of the same, such a composition consisting of approximately 100 parts of gum-like binder, and 100 to 300 parts of filler. The blank or backing in each case should be compressed and have a smooth polished surface before the same is pressed into contact with the veneer surface. In the case last referred to, the blank may be coated with a varnish such as a gutta percha solution to facilitate the transfer of the surface veneer thereon, when the binder of the backing is not of itself sufficiently adhesive to cause the veneer film to be transferred thereto when the heated blank is pressed into contact with the veneer. In addition to the substances referred to for the formation of the surface veneer, films formed of cellulose acetate or other cellulose esters may be used which may have compounded therewith a chlorinated fatty acid or derivative thereof, such as described in my Patent No. 855,556, dated June 4, 1907. Or the surface veneer may be formed from a varnish composition, comprising a cellulose ester, as acetyl cellulose, and a phenol or cresol resin, dissolved in acetylene-tetra-chlorid, with or without the addition of a halogenized fatty acid or derivative, and a small percentage of hexamethylene-tetra-amin, all as is described in my application Ser. No. 668,942, filed January 2, 1912, and upon which United States Patent No. 1,094,830 has been granted.

The blank or backing should be made thermo-plastic or "hot plastic," that is, have the property of becoming plastic when heated, in equal or greater degree than the surface film. The binder used in the backing may be shellac, copal gum, kauri, rosin, or mixtures of the same, or a phenolic condensation product, preferably a fusible soluble phenol resin, such as that referred to above.

In the formation of disk phonograph records or other sound records in practising this invention, I preferably proceed as follows: A disk is formed from a powder which comprises approximately two parts of wood flour or other suitable filler and one part phenol resin or equivalent. This disk is made as nearly uniform in thickness and density as may be but certain parts of the surface thereof will be somewhat porous or slightly depressed. The surface of this disk or backing is then lacquered with some of the

varnish composition of which the veneer is to be made, the lacquer being applied to the porous or depressed spots on the blank to fill the same up. The disk is then dried, and repressed in polished dies at a pressure which is somewhat less than the disk will thereafter be subjected to when the sound record impression is impressed in the surface veneer. The varnish may suitably be applied to the disk by spraying.

A hardened veneer is formed on a metallic smooth plate by coating the same as by spraying with a lacquer comprising approximately 100 parts phenol resin, 20 parts penta-chloro-phenol, 4 parts naphthalene, 6 to 8 parts hexa-methylene-tetra-amin all dissolved in 130 parts denatured alcohol or other solvent. This is dried and the excess of solvent eliminated by placing the metal plate with the lacquer thereon in an oven, and gradually raising the temperature over a period of ten hours up to 160° F. after which the temperature is raised to approximately 220° F. for a sufficient length of time to cause the reaction of the hexa-methylene-tetra-amin and phenol resin to form an infusible condensation product containing the penta-chloro-phenol as a plasticity ingredient. After the reaction is complete, the oven is allowed to cool down gradually to prevent cracking of the veneer.

When the veneer has been formed upon its metallic plate or blank mold, the blank disk previously formed as described, is welded to the veneer on the plate by pressing the blank into contact with the veneer at a less pressure than that at which the blank has been previously compressed, the pressure used not being sufficient to cause the blank to flow. The veneer is transferred from the metallic plate to the blank in this operation. Thereafter, if the sound record is to be formed upon the blank thus made, a record of the sound waves may be impressed upon the surface of the blank from a metallic matrix in such a manner as not to produce excessive flow of the base. By this means is formed a compound record disk having a hard but hot plastic surface and a plastic backing or body, there being, if desired, a record bearing surface veneer upon both sides of the backing. The backing consists of a substance which softens under the application of heat but which is given stiffness and ability to withstand excessive flow under pressure by the fibrous filler. Such a compound disk is permanently hot or thermo plastic both in the surface portion and in the backing and can be repressed a number of times successfully. In the case of sound records particularly, the lacquering of the body portion of the disk all over and especially at the porous spots is made to prevent "crackles" in the sound record, since it is

difficult to make the body of the powdered resin or similar material containing a large amount of fibrous filler, without producing porous spots at the surface.

- 5 The process which I have described is an extremely cheap and practical method for manufacturing molded objects, such as those described, because of the comparative cheapness of the blank molds in which the surface
10 veneer is formed.

In the drawing forming part of this specification is shown a side elevation of one embodiment of my invention, the materials employed in the said embodiment being described in the drawing.
15

Having now described my invention what I claim and desire to protect by Letters Patent is:—

1. A sound record or other object comprising a thermo plastic base having a surface veneer welded thereto, said surface veneer containing a final hardened phenolic condensation product and being sufficiently plastic at elevated temperatures to be pressed
20 or molded, substantially as described.
25

2. A sound record or other object comprising a base of thermo plastic material containing a fibrous filling material distributed through the same and having a surface veneer welded thereto, said surface veneer containing a final hardened phenolic condensation product and being sufficiently plastic at elevated temperatures to be pressed or molded, substantially as described.
30

3. A sound record or other object comprising a base containing a fusible phenolic resin and having a surface veneer of final hardened phenolic condensation product secured thereto, substantially as described.
35

4. A sound record or other article comprising a base of fusible resin containing a finely divided filling material distributed through the same, and a surface veneer welded to said base, said veneer containing a final hardened phenolic condensation product and being sufficiently plastic at elevated temperatures to be pressed or molded, substantially as described.
40

5. A sound record or other article comprising a base of fusible phenolic resin containing a fibrous filling material distributed through the same, and a surface veneer welded to said base, said veneer having a smooth surface free from air bubbles and extraneous particles and being formed of a hard infusible product, substantially as described.
45

6. A sound record or other object comprising a permanently thermo plastic base having a thin surface veneer welded thereto, said veneer having a smooth surface free from air bubbles and extraneous particles and being formed of a final hardened phenolic condensation product of such a
60

nature as to be permanently thermo plastic sufficiently to receive when heated a clear impression from a die, substantially as described. 65

7. A sound record or other object comprising a base of permanently thermo plastic material having a finely divided filling material distributed through the same, and having a thin surface veneer welded thereto, said veneer having a smooth surface free from air bubbles and extraneous particles and being formed of a final hardened infusible phenolic condensation product of such a nature as to be permanently thermo plastic sufficiently to receive when heated a clear impression from a die, substantially
70 as described. 75

8. A sound record or other object comprising a base of fusible resin having secured thereto a surface veneer of final hardened infusible phenolic condensation product of such a nature as to be permanently thermo plastic sufficiently to receive when heated a clear impression from a die, substantially as described. 80

9. A sound record or other object comprising a base of fusible phenolic resin having secured thereto a surface veneer of final hardened infusible phenolic condensation product of such a nature as to be permanently thermo plastic sufficiently to receive when heated a clear impression from a die, substantially as described. 85

10. A sound record or other object comprising a base of fusible phenolic resin having secured thereto a surface veneer of hard infusible material of such a nature as to become sufficiently plastic when heated to receive a clear impression from a die, substantially as described. 90

11. A sound record or other object comprising a base of fusible phenolic resin having a fibrous filling material distributed through the same and having a surface veneer welded thereto, said veneer having a smooth surface free from air bubbles and extraneous particles and being formed of a hard permanently thermo plastic material, substantially as described. 95

12. A sound record or other object comprising a base containing a fusible phenolic resin and having a surface veneer of hardened phenolic condensation product secured thereto, substantially as described. 100

13. A sound record or other object comprising a base containing wood fiber and a suitable thermo plastic binder therefor, and a surface layer of hardened phenolic condensation product, said surface layer being sufficiently thermo plastic to take when heated a clear impression from a die, substantially as described. 105

14. A sound record or other object comprising a base containing wood fiber and a
125

suitable thermo plastic binder therefor, the
filler being in excess of the binder, and a
surface layer containing a final hardened
phenolic condensation product, said surface
5 layer being sufficiently thermo plastic to
take when heated a clear impression from a
die, substantially as described.

This specification signed and witnessed
this 2nd day of September 1914.

JONAS W. AYLSWORTH.

Witnesses:

FREDERICK BACHMANN,
MARY J. LAIDLAW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

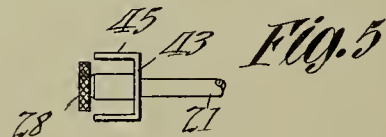
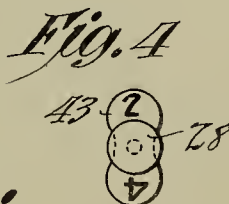
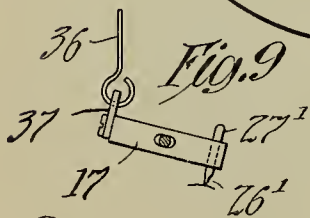
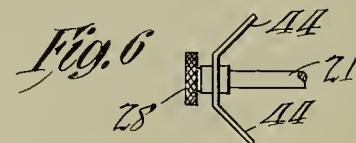
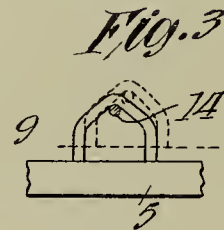
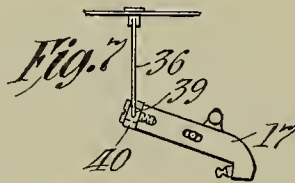
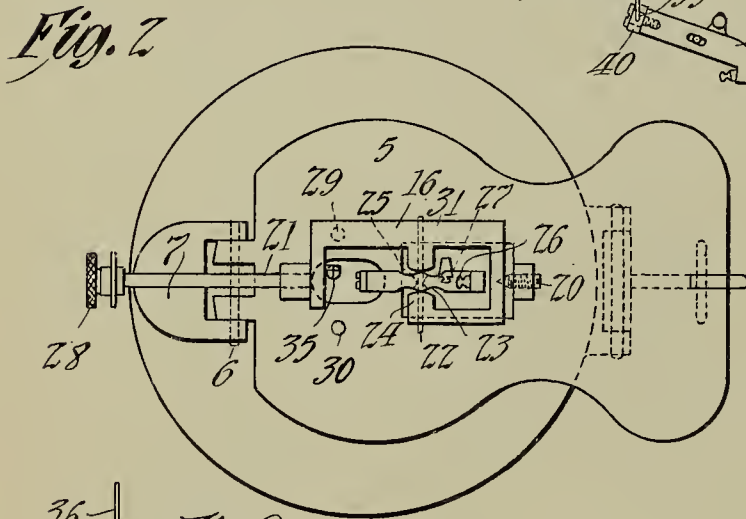
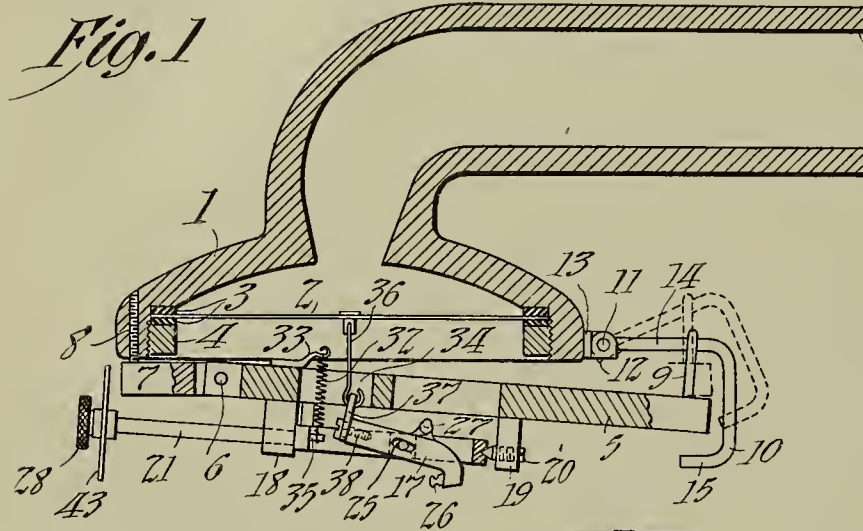
PHONOGRAPH PATENT.

PHONOGRAPH REPRODUCER,
1,167,489-----A.F.Gall,
Patented-Jan. 11, 1916.
Filed-Nov. 26, 1909.

A. F. GALL.
 PHONOGRAPH REPRODUCER:
 APPLICATION FILED NOV. 26, 1909.

1,167,489.

Patented Jan. 11, 1916.



Witnesses:
 Frank D. Lewis
 Dyer Smith

Inventor:
 Adolph F. Gall
 by Frank L. Dyer
 Atty.

UNITED STATES PATENT OFFICE.

ADOLPH F. GALL, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-REPRODUCER.

1,167,489.

Specification of Letters Patent.

Patented Jan. 11, 1916.

Application filed November 26, 1909. Serial No. 529,917.

To all whom it may concern:

Be it known that I, ADOLPH F. GALL, a citizen of the United States, and a resident of West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Reproducers, of which the following is a description.

My invention relates to phonograph reproducers which are provided with a pair of reproducing styli adapted to track records of different character, as for example, records having 100 and 200 threads per inch respectively, said styli being so mounted that either may, by a simple manipulation, be brought into or out of operative position with respect to the record surface at will. In my invention, the styli are carried by different surfaces of a single stylus lever, the stylus lever being pivotally mounted in such a manner that it may be rotated about an axis substantially parallel with the diaphragm of the reproducer, and substantially parallel to a diametrical plane of the sound record, in which plane is located the sound record groove which the stylus is adapted to track in order that either stylus may be brought into operative position. Preferably, the styli are carried by the top and bottom surfaces of the stylus lever, that is, 180 degrees apart, the lever being pivoted to a member which is rotatable about an axis extending longitudinally of the lever in lugs depending from the floating weight, the tail of the lever being connected to the diaphragm in such a manner that the diaphragm will not be placed under undue stress during the adjustment of the lever to position the stylus. Preferably, stops are provided to limit the rotation of the lever during adjustment to a swing of 180 degrees, and also, preferably, spring means are provided for holding the stylus lever in either adjusted position.

My invention also comprises an improved indicating means for indicating which stylus is in operative position. The object of my invention is the provision of suitable means of the character above described, and also the construction of parts and combinations of elements more particularly described in the following specification and claimed in the annexed claims.

In order that my invention may be more fully understood, reference is hereby made

to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central vertical section of a phonograph reproducer embodying my invention, certain parts being shown in side elevation. Fig. 2 is a bottom plan view of the same. Fig. 3 is a detail end view looking from the right in Fig. 1 showing the means for supporting the floating weight. Fig. 4 is a detail end view looking from the left in Fig. 1 showing one form of indicating device. Figs. 5 and 6 are detail views showing modified forms of the indicating device. Fig. 7 is a side elevation of the stylus lever showing modified connections to the diaphragm. Fig. 8 is an end view of the same looking from the left in Fig. 7. Fig. 9 is a side elevation of the stylus lever showing a modified form of stylus mounting.

In all of the above figures, corresponding parts are denoted by the same reference numerals.

Referring to the drawings, the reproducer shown comprises a sound box body 1 and diaphragm 2 clamped therein between gaskets 3 by the ring 4, the floating weight 5 being pivoted at 6 to the block 7, which is supported by the engagement of screw 8 within the sound box body 1. A stirrup 9 rises from the upper surface of the tail of floating weight 5, floating weight 5 being supported when the stylus is not in engagement with the sound record, from member 10 pivoted to sound box body 1 at 11, member 10 extending through stirrup 9. Member 10 is provided with a squared end 12 adjacent pivot 11, which squared end is adapted to abut against shoulder or stop 13 attached to the sound box body 1 when the member 10 is in such a pivotal position that the portion 14 thereof from which stirrup 9 is suspended is approximately horizontal or parallel to diaphragm 2. Member 10, accordingly, cannot swing below this position, although it may be moved pivotally through a vertical arc above this position to raise the floating weight. Member 10 is bent to extend around the end of floating weight 5, and the end 15 thereof extends below the tail of the floating weight. The weight may be lifted to raise the stylus out of engagement with the record by upward pressure upon the end 15 of member 10 which may be exerted by the finger or automatically by

some portion of the phonograph machine, when it is desired to lift the stylus from the record, it thus not being necessary to touch the floating weight itself for such lifting.

As stirrup 9 has the shape of an inverted V at its upper portion, the device is self-centering. The structure described in this paragraph is not my invention, but as to its novel features is the invention of Peter Weber, and is described and claimed by him in application No. 575,861, filed August 6, 1910.

Frame 16, which pivotally supports stylus lever 17 is rotatably mounted beneath floating weight 5 in the following manner: Lugs 18 and 19 extend downwardly from floating weight 5, and lug 19 is provided with a small screw 20 having a pointed end which acts as a center for frame 16. Spindle 21 integral with frame 16 is rotatably mounted in lug 18. Frame 16, which is thus rotatably mounted, carries a transverse pin 22 upon which stylus lever 17 is pivoted. The stylus lever is thus mounted to oscillate in a vertical plane. It is also preferable that the stylus lever should be permitted a certain amount of oscillation or lateral movement in a plane at right angles to this or substantially parallel to the diagram in order that the stylus may have a greater freedom in tracking the sound record. This lateral oscillation or movement may be provided in any desired manner. I have illustrated in the drawings a mounting for the lever permitting such movement similar to that described and claimed in my application Serial No. 517,336, filed September 11, 1909. As shown in the drawings, the pivot portion of the lever is of enlarged and rounded cross section as illustrated at 23, frame member 16 being provided with inwardly directed lugs 24 through which pivot pin 22 extends, these lugs being rounded as shown on the surface contacting portion 23 of the stylus lever, although this is not necessary, it only being necessary that the lugs be so shaped as not to interfere with the lateral swinging of the lever. The pivot portion of the lever 23 is apertured to receive pin 22. This aperture is of a diameter slightly greater than that of the pin 22 whereby any appreciable longitudinal movement of the lever is prevented. The material of the lever is cut away in the vicinity of the said aperture to form V-shaped slots 25, the upper and lower surfaces of which are flat. By this structure, the lever is permitted to oscillate to a limited degree upon pin 22 in a plane substantially parallel to diaphragm 2. Stylus lever 17 carries to the right of pivot 22, referring to Fig. 1, a pair of styli 26 and 27 which are mounted one on the upper and the other on the lower surface of lever 17, and which are adapted for tracking sound records of different character-

istics, as one having 100 threads per inch, and the other having 200 threads per inch. Spindle 21 extends beneath floating weight 5 and is provided with a knurled nut 28 or similar manipulative device which may be grasped between the fingers and rotated to rotate frame 16 in its bearings to place either stylus 26 or 27 in operative position. Floating weight 5 is provided with a pair of stops 29 and 30, one of which is contacted by the side portion 31 of frame 16 when the same is turned in one direction or the other through 180 degrees, one stylus or the other being in operative position when frame 16 is in contact with either lug. Preferably, I provide means for holding frame 16 in either adjusted position. As shown in the drawings, this means takes the form of a spiral spring 32 which is attached at one end to the hook 33 carried by the upper surface of floating weight 5 and which, passing through an opening 34 in floating weight 5, is attached at its other end to a pin 35 secured to or integral with frame 16. This pin 35 is mounted as shown somewhat to one side of the axis of rotation of frame 16, so that the spring will tend to pull the member 16 down into position contacting either stop 29 or 30 when it is rotated.

Stylus lever 17 is connected to diaphragm 2, as illustrated in Figs. 1 and 2, by means of the usual link 36 which is attached to diaphragm 2 in the usual manner, and which is provided at its other end with a hook passing through an eye in a short link 37 which is pivotally mounted on a screw 38 screwed longitudinally into the end of stylus lever 17 opposite to the end carrying styli 26 and 27. When frame 16 is rotated through 180 degrees in adjusting either stylus into operative position, link 37 swivels upon pin 38 and diaphragm 2 is thereby relieved of strain during the eccentric movement of the tail of lever 17 in its rotation. Another manner in which the stylus lever might be connected to the diaphragm is illustrated in Figs. 7 and 8. As shown in these figures, the tail of stylus lever 17 is given a reduced diameter, as shown at 39, and a ring 40 is rotatably mounted upon this reduced diameter 39. Ring 40 is provided with a pair of lugs 41 at opposite points thereon, to which lugs are secured the ends of a yoke 42 which is formed integral with link 36. The advantage of this latter construction is that as the stylus lever swings about its pivot in a vertical plane, the yoke may swing about lugs 41, thus giving a more universal connection than in the first form.

Spindle 21 carrying thumb nut 28 extends beyond the depending flange of sound box 1 and may be provided with indicating means for indicating which stylus is in position to engage the sound record. This in-

dicating means may take the form of a plate 43 secured to spindle 21 bearing suitable numerals as "2" and "4," as illustrated in Fig. 4, indicating the character of the record with which the stylus in operative position is adapted to coact, as a two minute record or a four minute record. In the forms illustrated in Figs. 1, 2 and 4, the index plate occupies a substantially vertical plane, and the figure legible thereon above the spindle 21 indicates which stylus is in operative position. In order, however, that the index characters may be more easily read from above the machine, index plate 43 may be bent at an angle, as illustrated in Fig. 6, into the wings 44 of plate 43 carrying the index characters, or the wings of plate 43 may be bent into a horizontal plane as indicated at 45 in Fig. 5.

In Fig. 9 I have illustrated a cylindrical stylus having bearing surfaces 26' and 27' on the opposite ends thereof, adapted to track sound records of different characters, as records having 200 and 100 threads to the inch respectively. This stylus may be formed of a single sapphire or of other suitable material, and secured in position in a hole extending through the stylus lever 17, with one stylus bearing surface above the upper surface of the lever and the other below the lower surface of the lever.

It is obvious that my invention might be applied to a phonograph reproducer employing vibratory means other than a simple diaphragm, as that indicated in the drawings at 2, and also that various other changes in the construction of the device might be made without departing from the spirit of my invention.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a device of the class described, the combination with vibratory means and a floating weight, of a member rotatably secured to said weight, the axis of rotation of said member being substantially parallel to a diametrical plane of the record in which is located the sound record groove and also approximately parallel to said vibratory means, a stylus lever carried by said member, and connections between said vibratory means and said lever, substantially as described.

2. In a device of the class described, the combination with vibratory means and a floating weight, of a stylus lever pivotally connected to said weight, a stylus projecting from each of two surfaces of said lever, connections between said vibratory means and said lever, means carried by said floating weight for rotating the pivot of said lever about an axis substantially parallel to the normal position of said vibratory means to rotate said lever and place either stylus in

operative position, and means for resisting rotation of said second named means away from the position corresponding with the engagement of either of said styli with the record, substantially as described.

3. In a device of the class described, the combination with vibratory means and a floating weight, of a member secured to said weight and rotatable about an axis substantially parallel to said vibratory means, a stylus lever pivoted to said member, and connections including pivotal means between said vibratory means and one extremity of said lever, substantially as described.

4. In a device of the class described, the combination with vibratory means and a floating weight, of a member rotatably secured to said weight, the axis of rotation of said member being substantially parallel to a diametrical plane of the record in which is located the sound record groove and also approximately parallel to said vibratory means, a stylus lever carried by said member, styli projecting from different faces of said lever, connections between one extremity of said lever and said vibratory means, and means resisting rotation of said member away from the position of engagement of either of said styli with the record, substantially as described.

5. In a device of the class described, in combination, a stylus lever, styli projecting from opposite faces thereof, a member in which said lever is pivoted, supporting means in which said member is rotatably mounted, the axis of rotation of said member being substantially parallel to a diametrical plane of the record in which is located the record groove, stops on said supporting means adapted to co-act with said member in its rotation, and spring means to hold said member in engagement with either of said stops, substantially as described.

6. In a device of the class described, in combination, a stylus lever, a plurality of styli projecting therefrom, a member in which said lever is pivoted, supporting means in which said member is rotatably mounted, vibratory means, a link connected thereto, and a member connected to one extremity of said lever and to said link and movable relatively to said lever about an axis extending longitudinally with respect to the axis of rotation of said first named member, substantially as described.

7. In a device of the class described, the combination with vibratory means and a floating weight, of a member secured to said weight and revoluble about an axis substantially parallel to said vibratory means, a lever pivoted to said member, styli projecting from said lever, connections between said vibratory means and one extremity of the said lever, and means including a shaft

secured to said member for rotating the latter to place either of said styli in operative position, substantially as described.

8. In a phonograph reproducer, the combination of a diaphragm; a floating weight; a member rotatably secured to said weight about an axis substantially parallel therewith; a lever pivotally attached to said member; means connecting one end of said lever with said diaphragm, but leaving the former free to rotate with said member; and two reproducing styli borne by the other

end of said lever and respectively adapted to contact with a record in different axial positions of said lever, one of said styli being adapted for playing on one kind of record and the other on a different kind, substantially as described. 15

This specification signed and witnessed this 22d day of November, 1909.

ADOLPH F. GALL.

Witnesses:

DYER SMITH,

JOHN M. CANFIELD.

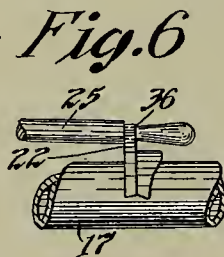
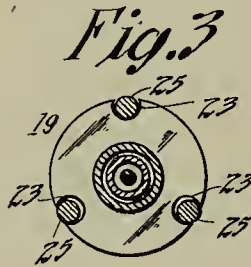
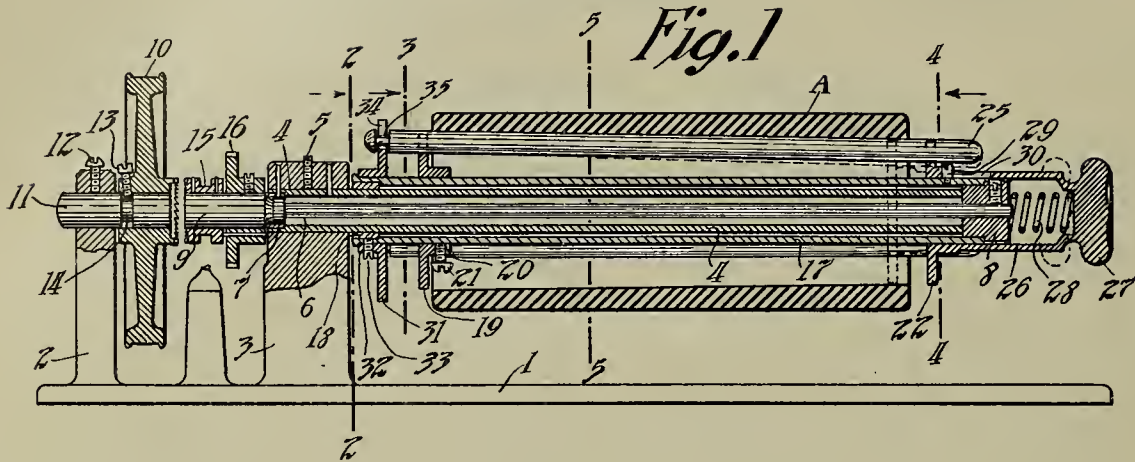
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH,
1,167,500-----N.H.Holland,
Patented-Jan. 11, 1916.
Filed-Oct. 6, 1911.

N. H. HOLLAND.
 PHONOGRAPH.
 APPLICATION FILED OCT. 6, 1911.

1,167,500.

Patented Jan. 11, 1916.



Witnesses:
Frederick Bachmann.

Inventor:
Newman H. Holland,
by Frank E. Dyer
his Atty.

UNITED STATES PATENT OFFICE.

NEWMAN H. HOLLAND, OF WEST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

1,167,500.

Specification of Letters Patent.

Patented Jan. 11, 1916.

Application filed October 6, 1911. Serial No. 653,155.

To all whom it may concern:

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of West Orange, in the county of Essex and State of New Jersey, have made a certain new and useful Invention in Phonographs, of which the following is a description.

My invention relates to phonographs and more particularly to an improved record support therefor.

Ordinary phonograph records change in diameter to a considerable extent under different temperature conditions, expanding under heat and contracting under cold, whereas the supports upon which the records are mounted change but little in diameter under the same conditions. As these supports are so constructed that when the records are placed thereon, a tight engagement will be maintained between the same and the records, it frequently happens that the latter become so tightly locked in place that it is difficult to remove them without damaging the record surface or breaking the records themselves.

The object of my invention is to provide a record support adapted to firmly hold a sound record or a sound record blank and yet to permit its ready removal. In conformity with this object, I preferably provide a support in which the record engaging means is movable toward and from the axis of the support so that the said means may be firmly held in engagement with the bore of the record or blank or moved inwardly to permit disengagement of the latter.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more fully understood, attention is hereby directed to the accompanying drawing forming a part of this specification and in which—

Figure 1 represents a vertical longitudinal section through the center of the mandrel of a phonograph embodying my invention, a part of the frame of the phonograph being shown in elevation; Figs. 2, 3, 4 and 5 represent sections of the mandrel taken on lines 2—2, 3—3, 4—4, and 5—5, respec-

tively, of Fig. 1; and Fig. 6 represents a fragmentary section of a modification of one of the details of construction.

In all of the views, corresponding parts are designated by the same reference numerals.

The phonograph to which my invention is shown applied in Fig. 1 is of well known construction and comprises a bed plate 1 provided with standards 2 and 3. Supported at one end in the standard 3 is a stationary tube or sleeve 4 secured rigidly in position by a set screw or equivalent means 5. The driving shaft 6 for the phonograph is mounted to extend through the tube 4, the left hand end of the said shaft, as shown in Fig. 1, being rotatable within a bearing 7 in the corresponding end of the tube or sleeve 4. A collar or plug 8 secured to the right hand end of the shaft 6, as shown in Fig. 1, engages the corresponding end of the tube 4 and coöperates with the enlargement 9, engaging the end of the bearing 7, to prevent the shaft 6 from shifting longitudinally with reference to the tube 4. Power is transmitted to the driving shaft of the phonograph by means of a belt (not shown) encircling the pulley 10 rotatable on the shaft 11 which latter is secured in the standard 2 by a screw or equivalent means 12. A screw 13 or other equivalent means engages in the groove 14 in the shaft 11 to prevent movement of the pulley 10 axially of the said shaft. The shaft 11 is axially in line with the shaft 6, to which it is adapted to be connected by a clutch 15, which is slidable back and forth upon the enlarged portion 9 of the driving shaft 6. Gear 16 is secured to the portion 9 of the shaft 6; and from this gear by connections (not shown) the feed screw of the phonograph is driven in the usual manner.

My improved record support comprises a tubular shaft 17 secured at one end as by friction, to the collar 8, so as to rotate with the shaft 6, and provided at its other end with a bearing 18 whereby it is rotatably mounted upon the tube 4.

The numeral 19 designates a rigid flange or disk provided with an integral collar 20 mounted on the shaft 17 adjacent the inner end thereof and secured thereto by a screw 21 or other desired fastening means. A

second rigid flange or disk 22 is slidably mounted on the shaft 17 adjacent the outer end thereof. The flange or disk 19 is provided with a number of equally spaced openings 23 at equal distances from the axis of the shaft 6, the flange or disk 22 being provided with an equal number of similarly arranged openings 24, the centers of the openings 24 being located slightly nearer than those of the openings 23 to the axis of the record support. Fitting loosely in each opening in the flange or disk 19 and a corresponding opening in the flange 22 is a rod or member 25 adapted to engage the bore of a phonograph record cylinder A. These rods, as shown, are preferably cylindrical in form; and, as more clearly shown in Figs. 3 and 4, the openings therefor in the flanges 19 and 22 extend throughout slightly more than a semi-circle so that the said rods 25 are retained against disengagement laterally from the said flanges and at the same time extend slightly beyond the latter, so that each presents an unobstructed portion adapted to engage the bore of the record. The openings or seats 23 and 24 are made slightly larger in diameter than the rods, so as to permit an easy movement of the latter therein during the manipulation of the device. By reason of the location of the openings 24 nearer the axis of the support than the openings 23, the support formed by the rods 25 has a slight taper toward the outer end thereof. It is evident that when the distance between the flanges or disks 19 and 22 is decreased by moving the flange 22 inwardly, the taper of the said support will increase sufficiently to permit the removal of the record therefrom, the flange or disk 19 acting as a fulcrum for the rods 25. In order to permit an easy manipulation of the flange or disk 22, I provide the same with a cup-shaped portion 26 slidably mounted on the shaft 17, this cup-shaped portion being preferably provided with a knurled head 27 to facilitate the operation thereof. A coiled spring 28 or other suitable compression member is located between the end of the bore of the cup-shaped member 26 and the collar 8 and serves to hold the flange or disk 22 in its outer position, thereby retaining the members 25 in firm engagement with the bore of the record. The pin 29 or other suitable guide is secured to the shaft 17 and coöperates with a longitudinal slot 30 in the cup-shaped member 26 to hold the flange 22 with its openings in axial alinement with the openings in the flange 19. This pin also serves by its engagement with the ends of the said slot to limit the axial movement of the cup 26 and flange 22.

In order to prevent longitudinal movement of the rods or record engaging members 25, I preferably employ the flange or

disk 31 provided with a collar 32 secured to the shaft 17 as by set screw 33, this set screw also preferably serving to hold the bearing 18 in position within said shaft. This flange is provided with radial slots or openings 34 adapted to receive the reduced necks 35 on the rods 25, these necks forming shoulders adapted to engage the opposite faces of the flange 31 to prevent longitudinal movement of the said rods. As shown in the drawing, the flange 22 is slidable longitudinally over the rods 25.

In Fig. 6 I have shown a record engaging rod 25 tapering inwardly, as shown at 36, over the portion adapted to be engaged by the flange 22, whereby the amount of inward or outward movement of the rods 25 for a given amount of longitudinal shifting of the flange 22 is materially increased.

In using my invention, the record may be placed upon the support by merely sliding the same along the rods 25 until it is firmly held thereon by friction. When it is desired to remove the record, it is simply necessary to force the member 27 inwardly to collapse the record support, whereupon the record may be easily removed by hand, even though previous to the collapsing of the support it may have been securely shrunk or clamped thereon.

While I have shown certain preferred embodiments of my invention, I do not wish to be limited to those disclosed, as my invention may evidently be carried out in numerous other ways. In short, my invention is limited only as defined by the terms of the appended claims.

Having now described my invention, what I claim as new and desire to protect by Letters Patent of the United States is as follows:—

1. In a device of the class described, the combination of a shaft, a plurality of supporting members arranged about said shaft and adapted to engage the bore of a sound record, and means for changing the inclinations of said supporting members relatively to said shaft, said means comprising a manually operable device coaxial with said shaft, engaging said supporting members and movable bodily longitudinally thereof, and means tending automatically to move said device in a given direction longitudinally of said members, substantially as described.

2. In a device of the class described, the combination of a plurality of movable members arranged about an axis to engage an article to be supported, supporting means for said members, said supporting means engaging said members and being immovable toward and away from said axis, and means coacting with said supporting means for automatically moving said members away from said axis, substantially as described.

3. In a device of the class described, the combination of a plurality of record engaging members grouped about a common axis, and a plurality of relatively movable rigid supporting members respectively engaging said first named members at different points in the length of the same and adapted to normally retain said first named members against displacement in directions toward and away from the said axis, each of said supporting members engaging all of said record engaging members, said supporting members being adapted by their relative movement to move said record engaging members toward or away from each other, substantially as described.

4. In a device of the class described, the combination of a plurality of record engaging members grouped about a common axis, and a plurality of supporting means respectively engaging said members at different points in the length of the same at a fixed distance from said axis and adapted to normally retain said members against displacement in directions toward and away from said axis, said supporting means being adapted by their relative movement to move said members toward or away from each other, substantially as described.

5. In a device of the class described, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof, and a plurality of rigid supports each having seats for all of said members, one of said supports being movable relatively to the other along said shaft and having connected therewith means for manually moving the same along said shaft to change the relative inclination of said members, substantially as described.

6. In a device of the class described, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof and inclined at an angle thereto, a plurality of unitary supports for said members, one of said supports being in engagement with all of said members and being movable longitudinally of said shaft, means comprising a single controlling member for manually moving said last named support in one direction, said controlling member projecting beyond one end of said record engaging members, and resilient means for moving the same in the opposite direction, substantially as described.

7. In a device of the class described, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof and inclined at an angle thereto, and a plurality of unitary supports for said members each engaging all of said members at different points in the length of the same, one of said supports being movable longitudinally of said shaft and having connected therewith means for manually

moving the same along said shaft to change the relative inclination of said members, substantially as described.

8. In a device of the class described, the combination with a shaft, of a plurality of record engaging members extending longitudinally of said shaft and inclined at an angle thereto, a plurality of supports for said members, one of said supports having seats in which said members are slidable longitudinally, means for manually moving said last named support in one direction, and means for automatically moving the same in the opposite direction, substantially as described.

9. In a device of the class described, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof, and a plurality of members supporting said record engaging members at an angle to said shaft, said record engaging members being slidably connected to one of said supporting members and one of said supporting members being movable along said shaft toward and away from the other to change the inclination of said record engaging members, substantially as described.

10. In a device of the class described, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof, a plurality of flanges arranged at different points in the length of said members and supporting the same at an angle to said shaft, one of said flanges engaging all of said members and being movable along said shaft toward and away from the other flange without turning laterally with respect to said other flange, and means for manually moving said movable flange to change the inclination of said record engaging members, substantially as described.

11. In a device of the class described, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof, a plurality of flanges supporting said members at an angle to said shaft, one of the said flanges engaging all of said members and being movable toward and away from the other, means for manually moving said last named flange in one direction, and resilient means for moving the same in the opposite direction, substantially as described.

12. In a device of the class described, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof, a plurality of flanges supporting said members at an angle to said shaft, one of the said flanges engaging all of said members and being movable toward and away from the other and being adapted by its movement to change the inclination of said record engaging members, and means for preventing longitudinal move-

ment of said members relatively to said shaft, substantially as described.

13. In a device of the class described, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof, a plurality of flanges supporting said members at an angle to said shaft, one of the said flanges engaging all of said members and being movable toward and away from the other and being adapted by its movement to change the inclination of said record engaging members, and flanged means for preventing movement of said members longitudinally of said shaft, substantially as described.

14. In a device of the class described, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof, a plurality of flanges supporting said members at an angle to said shaft, one of the said flanges engaging all of said members and being movable toward and away from the other, means for manually moving said last named flange in one direction, and means for automatically moving the same in the opposite direction, said members being longitudinally immovable with respect to said shaft, substantially as described.

15. A record support comprising the combination of a plurality of rods of substantially circular cross section grouped about the axis of the support and adapted to engage the bore of a record, and supporting means for said rods comprising flanges each having seats for all of said rods, said flanges being arranged at different points in the length of the rods and being movable relatively to each other to change the relative inclination of said rods, substantially as described.

16. A record support comprising the combination of a plurality of rods grouped about the axis of the support and adapted to engage the bore of a record, portions of said rods being tapered, and supporting means for said rods comprising members, one of which engages the tapered portions of the rods and is movable along said tapered portions toward the other member to change the relative inclinations of the rods, substantially as described.

17. In a device of the class described, the combination of a shaft, a plurality of record engaging members grouped about the axis of said shaft, and means comprising unitary supports each having seats for all of said members for mounting said members on said shaft, said supports being designed to invariably hold the said members inclined at substantially equal angles to the axis of said shaft and being movable relatively to each other to change the relative inclination of said members, substantially as described.

18. In a device of the class described, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof and arranged about the same, and a plurality of supports for holding said members against displacement toward or away from said shaft, one of said supports coacting with all of said members and being non-rotatable with respect to said members but movable along said shaft toward and from the other support, substantially as described.

19. In a device of the class described, the combination of a plurality of movable members arranged about an axis to engage an article to be supported, supporting means for said members, said supporting means engaging said members and being immovable toward and away from said axis, and means coacting with said supporting means for moving said members automatically away from said axis and for moving the same manually toward said axis, substantially as described.

20. In a device of the class described, the combination of a plurality of supporting members arranged about a given axis and adapted to engage the bore of a sound record, and spring pressed means for automatically moving said members away from said axis, said spring pressed means comprising a device engaging said supporting members for sliding movement longitudinally thereof, substantially as described.

This specification signed and witnessed this 4th day of October 1911.

NEWMAN H. HOLLAND.

Witnesses:

ANNA R. KLEHM,
JULIUS H. POHLMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

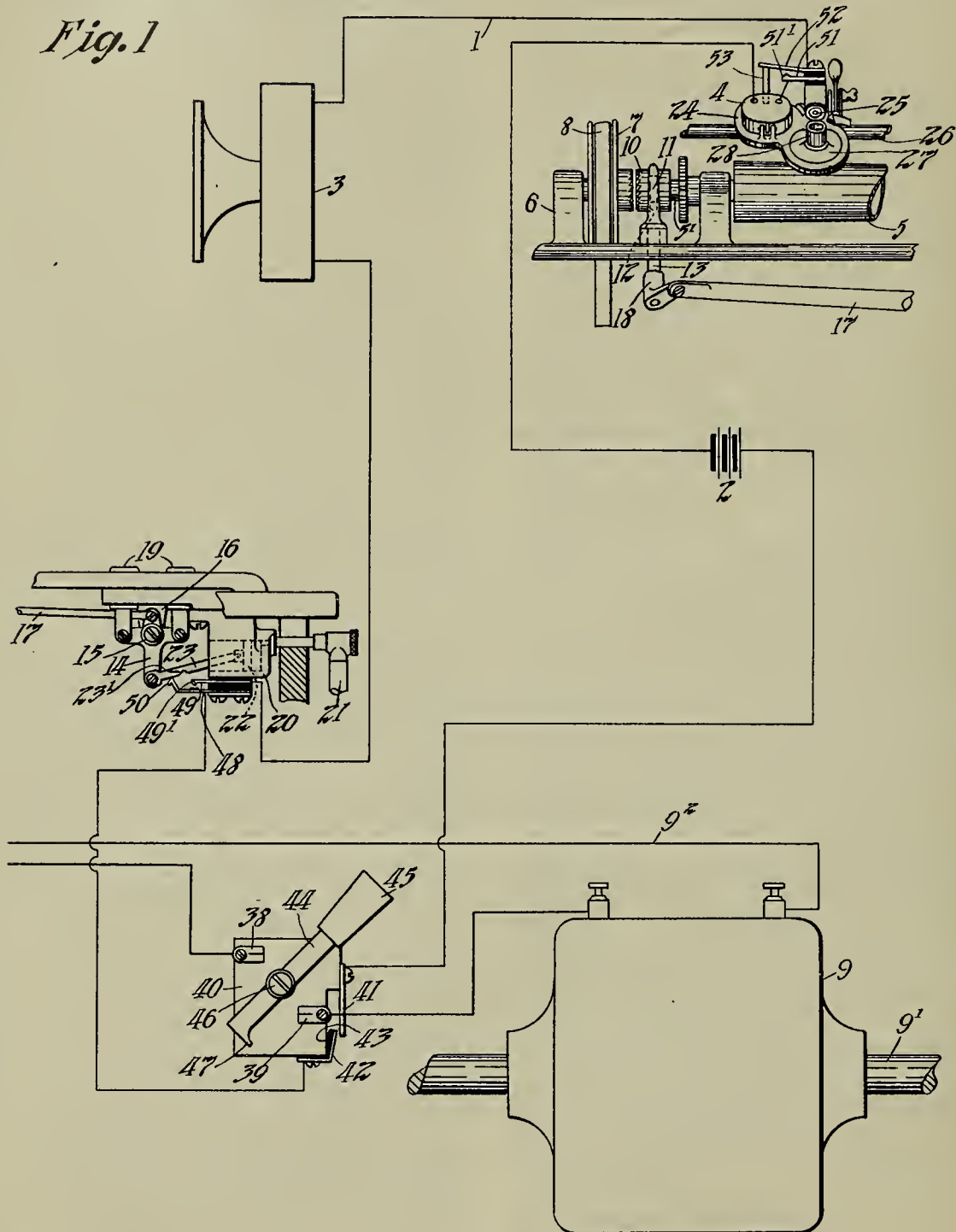
PHONOGRAPHIC APPARATUS,
1,167,501-----N. H. Holland,
Patented-Jan 11, 1916.
Filed-Nov 8, 1911.

N. H. HOLLAND.
 PHONOGRAPHIC APPARATUS.
 APPLICATION FILED NOV. 8, 1911.

1,167,501.

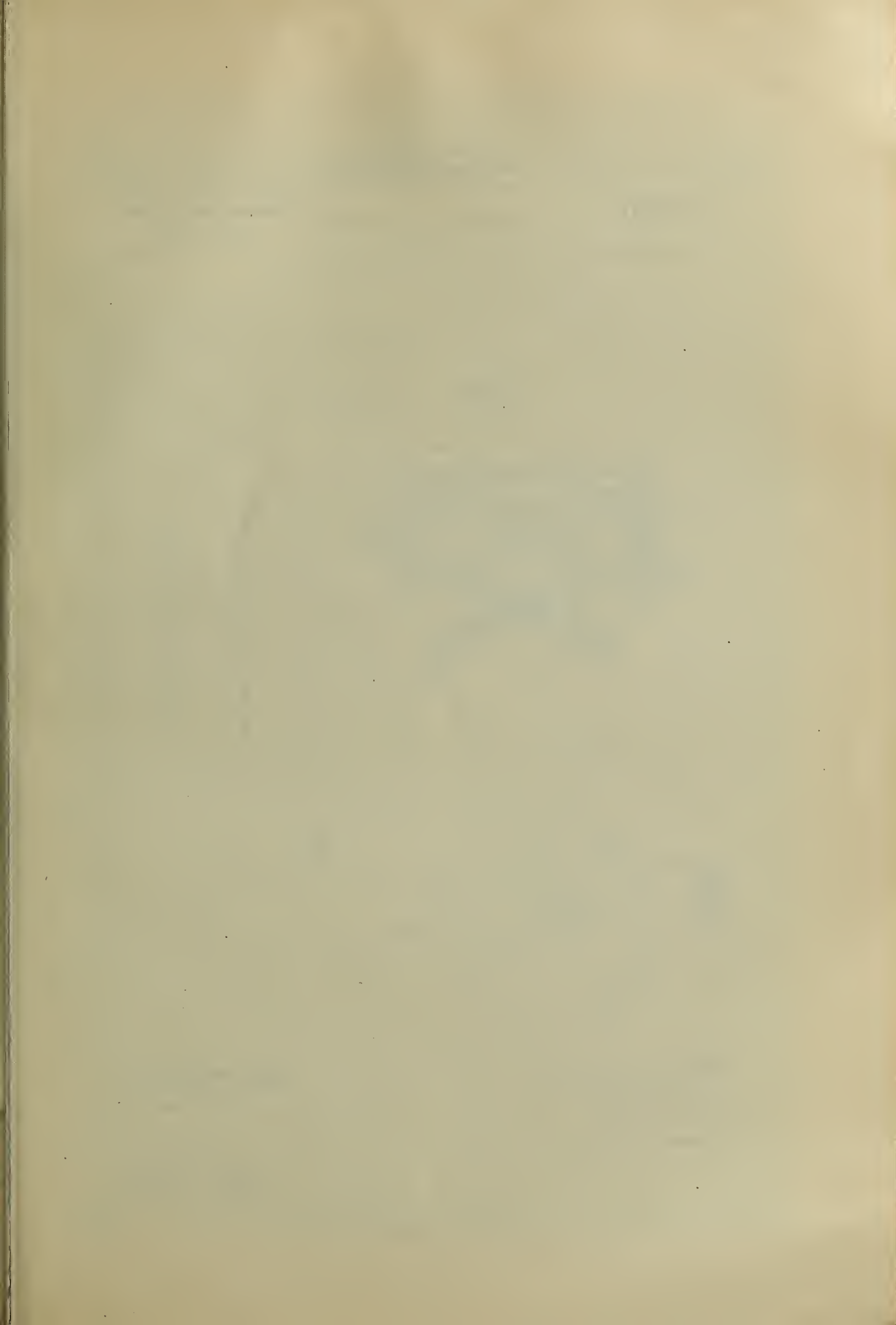
Patented Jan. 11, 1916.

2 SHEETS—SHEET 1.



Witnesses:
Alfred Dresser
Frederick Bachmann

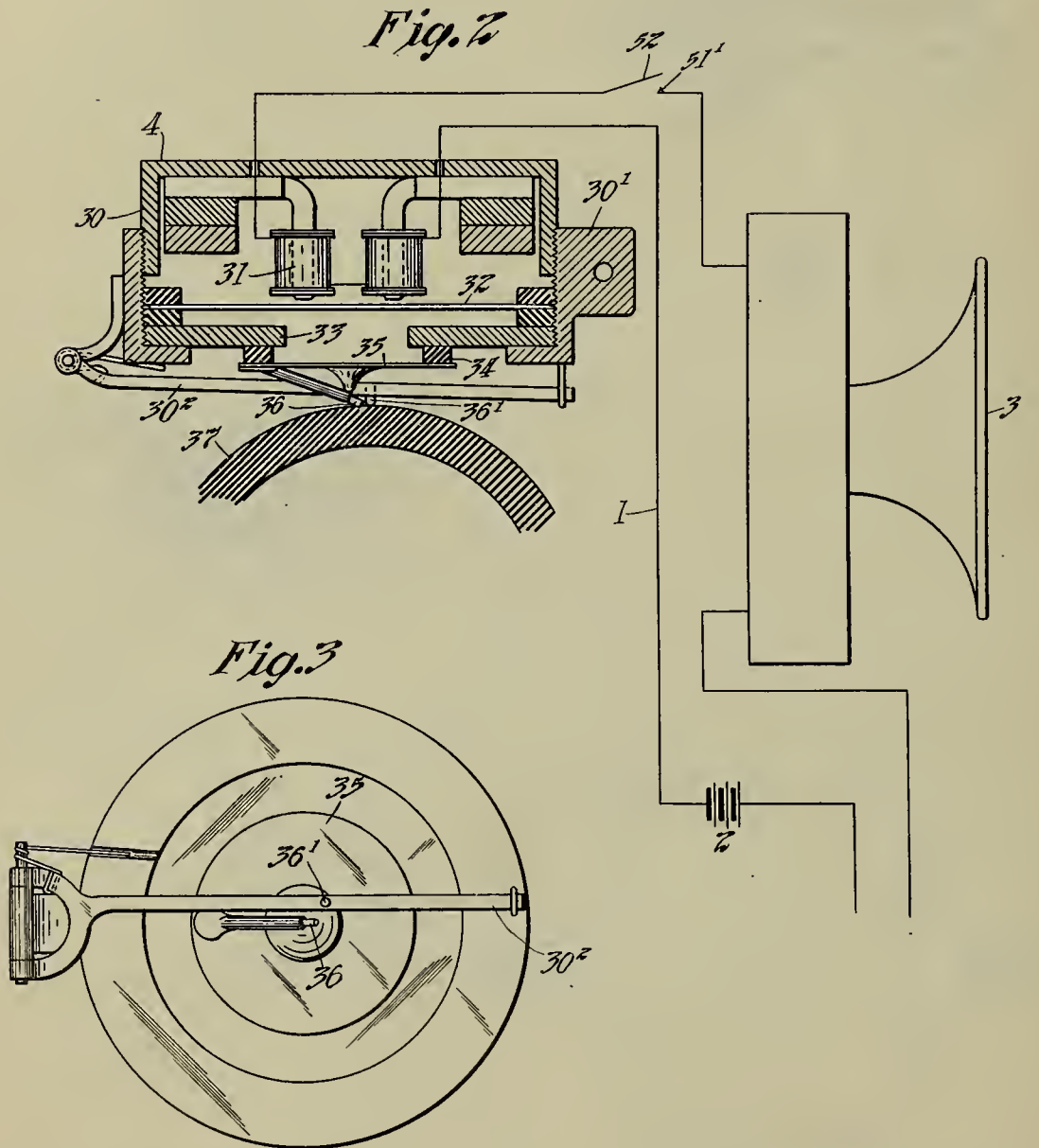
Inventor:
Newman H. Holland
by Frank W. Ayer
His Atty.



N. H. HOLLAND.
 PHONOGRAPHIC APPARATUS.
 APPLICATION FILED NOV. 8, 1911.

1,167,501.

Patented Jan. 11, 1916.
 2 SHEETS—SHEET 2.



Witnesses:
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Frederick Bachmann

Inventor:
Nevoman H. Holland
by Frank L. Dyer
his Atty.

UNITED STATES PATENT OFFICE.

NEWMAN H. HOLLAND, OF WEST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPHIC APPARATUS.

1,167,501.

Specification of Letters Patent.

Patented Jan. 11, 1916.

Application filed November 8, 1911. Serial No. 659,092.

To all whom it may concern:

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographic Apparatus, of which the following is a description.

My invention relates to phonographic apparatus and more particularly to a combined telephone and phonograph, whereby oral communications over a telephone line may be automatically recorded.

The principal object of my invention is to provide a device of this character having means for preventing the flow of current through the telephone circuit and thereby preventing waste of current in said circuit when the phonograph is not in operation.

In its preferred form, my invention comprises a single operating member for simultaneously closing a gap in the telephone circuit and starting the phonograph motor, and means for maintaining said circuit open until the recorder is placed in operative position relatively to the record supporting mandrel, and until the clutch between the motor and record support is thrown in to cause the rotation of the mandrel. With this construction, the telephone circuit is not closed until the phonograph is completely adjusted for operation.

Other objects of my invention are the provision of improved details of construction and combinations as hereinafter more fully set forth and claimed.

In order that my invention may be more fully understood, attention is hereby directed to the accompanying drawings forming part of this specification and in which—

Figure 1 is a diagrammatic view illustrating the preferred embodiment of my invention, some of the parts being shown in elevation; Fig. 2 is a central vertical sectional view of the preferred form of recorder used with my invention, a part of the circuit including said recorder being shown diagrammatically; and Fig. 3 is a bottom plan view of the recorder.

In all of the views, like parts are designated by the same reference numerals.

Referring to the drawings, the numeral 1 designates a circuit including a battery 2, a telephone transmitter 3, and a recording

sound box 4 adapted to be placed in contact with the surface of a record tablet (not shown) upon a horizontal record supporting mandrel 5. The mandrel 5 is mounted in the frame 6 of the phonograph and is adapted to be rotated by a pulley 7 supported in alinement therewith on the frame of the phonograph and connected as by a belt 8 with the drive shaft 9' of the phonograph motor 9. In the construction shown in Fig. 1 of the drawings, an electric motor is employed, the motor circuit being designated by the numeral 9². In order to provide for stopping the rotation of the mandrel 5 without stopping the motor, a clutch 10 is mounted on the shaft 5' of the record support so as to rotate therewith but to be capable of longitudinal movement thereon, this clutch being formed with a serrated lateral surface adapted to mesh with a correspondingly shaped surface adjacent the same on the pulley 7. The clutch 10 is adapted to be moved along the shaft 5' into or out of engagement with the pulley 7 as by an arm 11 engaging within the groove 12 formed in the periphery of the clutch, the arm 11 being provided with a downwardly projecting shank 13 rotatably mounted in the base plate of the phonograph slightly in front of the portion of the said arm in engagement with the clutch.

The numeral 14 represents a cross shaped member pivoted at the intersection of the two arms thereof, as at 15, to a lug 16 depending from the base plate of the phonograph. The upper arm of member 14 is pivotally connected to one end of the link 17, which is pivotally connected at its opposite end to a crank 18 secured to the bottom of the shank 13 of the arm 11. Push buttons 19 projecting above the base plate of the phonograph and pivotally connected at their lower ends to the lateral arms of the member 14 serve to oscillate the said member to shift the link 17 and thereby rotate the crank 18 and arm 11 to actuate the clutch 10. Pneumatic means may also be employed to operate the clutch 10, these means, as shown, comprising a cylinder 20, the interior of which is adapted to be connected, as by the hollow angular connection 21, with a rubber tube (not shown) connected to any suitable device (not shown) for controlling the flow of air into and out of the cylinder 20. A

suitable controlling device of this character has been invented by Charles Schiff and is shown and described by him in an application Serial No. 572,796, filed July 20, 1910.

5 A piston 22 is slidably mounted within the cylinder 20 and has pivotally connected thereto one end of a link or bar 23, the other end of which is pivotally connected to the lower arm of the member 14. The lower arm
10 of the member 14 for a reason which will hereinafter appear is made of such a length that the link or bar 23 is inclined at an angle to the axis of the cylinder 20. Flow of air into and out of the cylinder causes the shifting
15 of the piston in the cylinder to rock the member 14 on its pivot and operate the clutch 10 in the manner hereinbefore described.

The recording sound box 4 is mounted in
20 a spectacle frame 24 pivoted at 25 to the carrier arm of the phonograph for movement about an axis at an angle to the horizontal, the numeral 26 representing the guide rod upon which the forward end of the said
25 arm is slidably mounted. The spectacle frame also carries a reproducing sound box 27 which is provided with a neck 28 adapted to be connected in a well known manner to an amplifying horn or other sound conduit
30 (not shown). By movement of the spectacle frame 24 about the pivot 25, either the recording sound box 4 or the reproducing sound box 27 may be moved at will directly into or out of operative position with respect
35 to a record cylinder on the mandrel 5.

The recorder which I prefer to use in connection with my invention comprises a casing 30 provided with an electromagnet 31 connected in the circuit 1, and with a diaphragm 32 located adjacent to the poles of the magnet 31. The bottom of the casing
40 30 is spaced from the diaphragm 32 and is provided with a central opening 33 of a smaller diameter than the diaphragm 32. A ring 34 of rubber or other elastic material is secured to the outside of the casing concentric with the opening 33 and supports a diaphragm 35 of smaller diameter than the diaphragm 32, the diaphragm 35 being provided with a stylus 36 for recording upon
45 the cylinder 37. When electric undulations or impulses are impressed upon the line or circuit 1 by the transmitter 3, the diaphragm 32 is set into vibration by the magnet 31, the air below the diaphragm 32 setting up in the diaphragm 35 and the stylus 36 corresponding vibrations, which are recorded by the stylus 36 in the cylinder 37. By employing the reduced sound passage 33 and a recording diaphragm 35 smaller than the receiver diaphragm 32, the vibrations of the diaphragm 32 are imparted with increased amplitude to the stylus, and the record impression is correspondingly increased
50 in depth, so that a louder reproduction is ob-

tainable. The sound box is preferably connected to the spectacle frame by a hinge 30' and is supported to permit a proper depth of cut of the stylus by a spring pressed arm 30' having a curved projection 36' engaging
70 the record to one side of the stylus. This manner of supporting the sound box on the record is claimed and fully disclosed in my application, Serial No. 598,069, filed December 19, 1910.

In order to prevent the closing of the telephone circuit before the motor is set into operation, I provide the motor circuit with spaced contacts 38 and 39 mounted upon one face of a piece of insulation 40, the telephone circuit being provided with spaced
80 contacts 41 and 42, likewise secured to the member 40 and having free ends extending into proximity to each other. The rear face of the contact 42 is provided with a backing 43 of suitable insulating material.

The numeral 44 represents a switch of conducting material provided with an insulating handle 45 and pivoted at 46 to the member 40. The switch 44 is provided with
90 a laterally projecting toe 47 adapted to engage the insulation 43 when the handle 45 is shifted to the left, as shown in Fig. 1, to force the contact 42 into engagement with the contact 41, this same adjustment of the handle serving to move the switch 44 into engagement with the contacts 38 and 39 and thereby close both the motor circuit and the gap between the contacts 41 and 42 in the telephone circuit.

In order to prevent the closing of the telephone circuit before the clutch is thrown into engagement with the pulley 7 to rotate the mandrel, I provide the telephone circuit with two additional contacts 48 and 49 insulated from each other and preferably secured to the bottom of the cylinder 20. The contact 49 is so located as to face the contact 48 and is provided with a knife edge 49'. The contact 48 is constructed of resilient material and tends normally to engage the knife edge 49'. The forward end of the contact 48 is provided with an upwardly projecting extension 50 resting in engagement with the lower surface of the inclined link or bar 23. As shown in Fig. 1, the piston is in the position corresponding to the disengagement of the clutch 10 with the pulley 7, the contact 48 being pressed by the link or bar 23 out of engagement with the knife edge 49' of the contact 49. When air is forced into the cylinder 20 to shift the piston 22 from the position shown, the extension 50 rides upwardly on the link or bar 23 and finally engages within the notch 23' in the lower face of said link or bar to permit the contact 48 to engage the knife edge 49' and thereby close the gap formed in the telephone circuit by the prior separation of the said contacts. When the

piston is again drawn back to the position shown in Fig. 1, the link 23 forces the projection 50 downwardly by wedging action and thereby moves the contact 48 out of engagement with the knife edge 49' of the contact 49.

I also provide means for forming a gap in the telephone circuit when the recorder is not in operative position. These means comprise a plurality of contacts 51 and 52 insulated from each other, the contact 52 being formed of resilient material and having a tendency to contact the knife edge 51' on the contact 51. The contact 52 is adapted to be engaged by a finger or projection 53 on the spectacle frame 24 when the recorder is shifted out of operative position to thereby separate the contacts 52 and 51. By the means hereinbefore described, it is evident that the telephone circuit cannot be closed until the phonograph is completely adjusted for operation.

It is understood that my invention is not limited to the specific embodiment described above, but that it includes all the modifications falling within the scope of the appended claims.

Having now described my invention what I claim and desire to protect by Letters Patent is as follows:

1. In a device of the class described, the combination with a record support, of a circuit including an electrically operable sound box, said sound box being movable into and out of operative position with respect to said support, and means for opening said circuit by the movement of the said sound box into inoperative position with respect to said support, substantially as described.

2. In a device of the class described, the combination with a rotatable record support, a motor, means for connecting said motor to said record support to rotate the latter, and means for rendering said connecting means inoperative, of a circuit including an electrically operable sound box, said sound box being movable into and out of operative position with respect to said support, means for forming a gap in said circuit by the movement of said sound box into inoperative position with respect to said support, and means for forming a gap in the same by the operation of said second named means, substantially as described.

3. In a device of the class described, the combination with a rotatable record support, a circuit including an electric motor, means for rotating said record support from said motor, and means for rendering said first named means inoperative, of a circuit including an electrically operable sound box, said sound box being movable into and out of operative position with respect to said support, unitary means for opening and closing a gap in both of said circuits,

means for forming a gap in said second named circuit by the movement of said sound box into inoperative position with respect to said record support, and means for forming a gap in the said second named circuit by the operation of said second named means, substantially as described.

4. In a device of the class described, the combination with a rotatable record support, a circuit including an electric motor, means for rotating said record support from said motor, and means for rendering said first named means inoperative, of a circuit including an electrically operable sound box mounted adjacent said support, a single switch for opening and closing a gap in both of said circuits, and means for forming a gap in said second named circuit by the operation of said second named means, substantially as described.

5. In a device of the class described, the combination with a rotatable record support, and a circuit including an electric motor for rotating said support, of a second circuit including an electrically operable sound box mounted adjacent said support, and unitary means for closing both of said circuits, substantially as described.

6. The combination with a rotatable record support and a circuit including an electric motor for rotating said support, of means for recording upon or reproducing from a tablet carried by said support, said means comprising an electrically operable sound box, a circuit including said sound box and circuit breaking means, a switch for opening and closing a gap in both of said circuits, and means for permitting movement of said first named means from recording to reproducing position and for operating said circuit breaking means by such movement, substantially as described.

7. The combination with a rotatable record support, a motor, means for rotating said record support from said motor, and means for rendering said first named means inoperative, of means for recording upon or reproducing from a tablet carried by said support, said means comprising an electrically operable sound box, a circuit including said sound box and circuit breaking means, unitary means for opening and closing a gap in said circuit and stopping and starting said motor, means permitting movement of said recording and reproducing means from recording to reproducing position and for operating said circuit breaking means by such movement, and means for forming a gap in said circuit by the operation of said second named means, substantially as described.

8. In a device of the class described, the combination with a rotatable record support, a motor, means for rotating said record support from said motor, and means for render-

ing said first named means inoperative, of a circuit including an electrically operable sound box mounted adjacent said support, unitary means for opening and closing a gap in said circuit and stopping and starting said motor, and means for forming a gap in said circuit by the operation of said second named means, substantially as described.

9. In a device of the class described, the combination with a rotatable record support, and means comprising a motor for rotating said support, of a circuit including an electrically operable sound box, said sound box being movable into and out of operative position with respect to said support, unitary means for opening and closing a gap in said circuit and stopping and starting said motor, and means for forming a gap in said circuit by the movement of said sound box into inoperative position with respect to said record support, substantially as described.

10. In a device of the class described, the combination with a rotatable record support, and means comprising a motor for rotating said support, of a circuit including an electrically operable sound box mounted adjacent said support, and unitary means for opening and closing said circuit and stopping and starting said motor, substantially as described.

11. The combination of a record support, means for recording upon or reproducing from a tablet carried by said support, said means comprising an electrically operable sound box, a circuit including said sound

box and circuit breaking means, and means permitting movement of said recording and reproducing means from recording to reproducing position and for operating said circuit breaking means by such movement, substantially as described.

12. In a device of the class described, the combination with a rotatable record support, and a circuit including an electric motor for rotating said support, of a second circuit including a transmitter and a recorder mounted adjacent said support, and means for simultaneously closing both of said circuits, substantially as described.

13. The combination of a record support, a circuit including a sound box, a second sound box, and means for permitting movement of one sound box into and the other sound box out of operative relation to said record support and for forming a gap in said circuit by said movement, substantially as described.

14. The combination with a record support, a circuit including a sound box, said sound box being movable about an axis at an angle to said record support into and out of operative position with respect to said support, and means for opening said circuit by movement of said sound box out of operative position with respect to said support, substantially as described.

This specification signed and witnessed this 6th day of November, 1911.

NEWMAN H. HOLLAND.

Witnesses:

FREDERICK BACHMANN,
ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE,
1,167,796-----F. Cirelli,
Patented-Jan. 11, 1916.
Filed-April 22, 1915.

F. CIRELLI.
TALKING MACHINE.
APPLICATION FILED APR. 22, 1915.

1,167,796.

Patented Jan. 11, 1916.
2 SHEETS—SHEET 1.

FIG. 1.

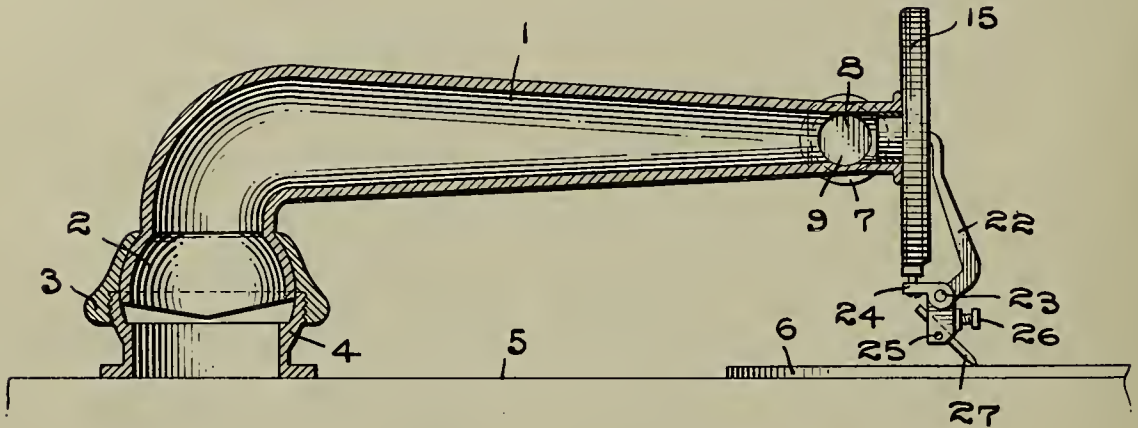


FIG. 2.

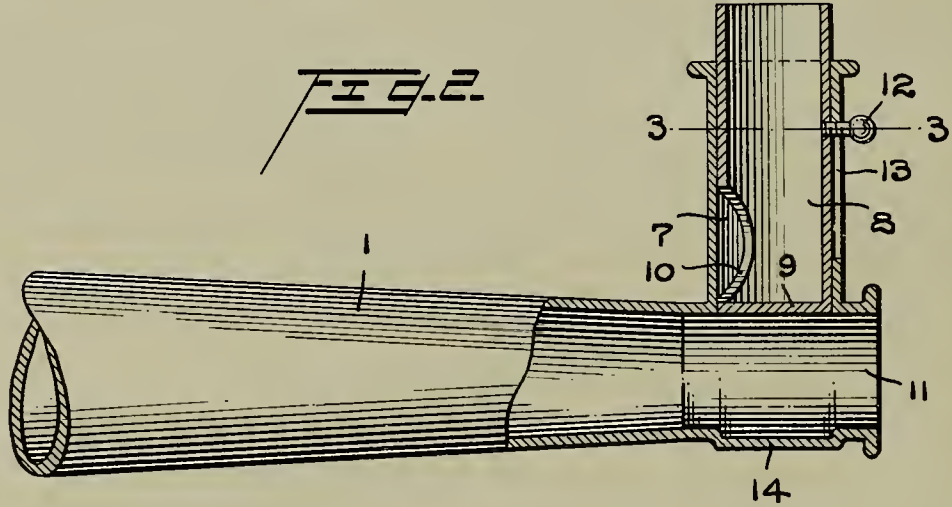
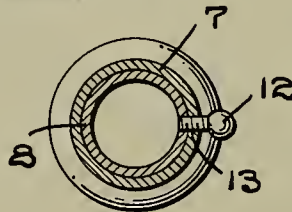
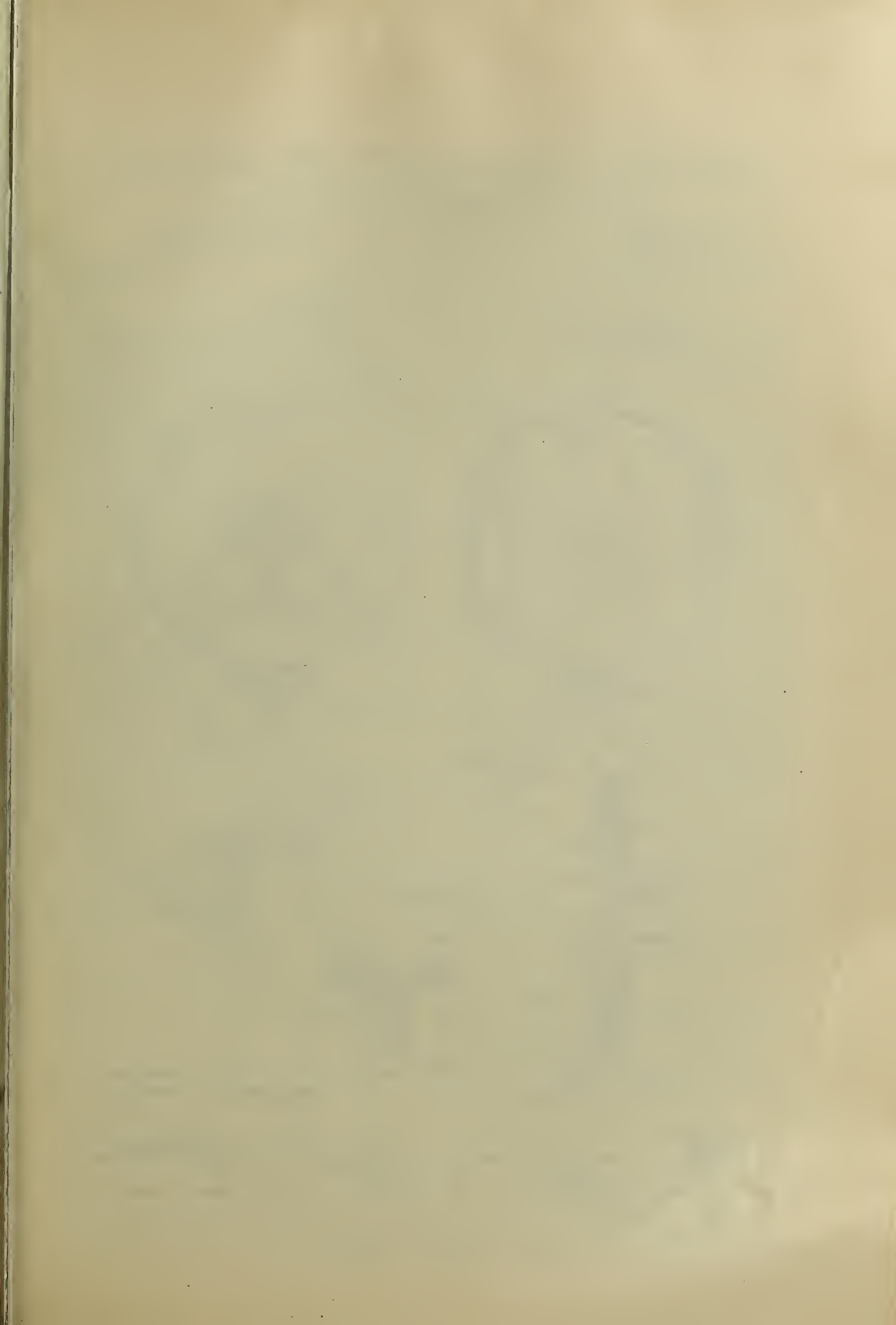


FIG. 3.



Witnesses
L. R. Meyer
C. R. Ziegler

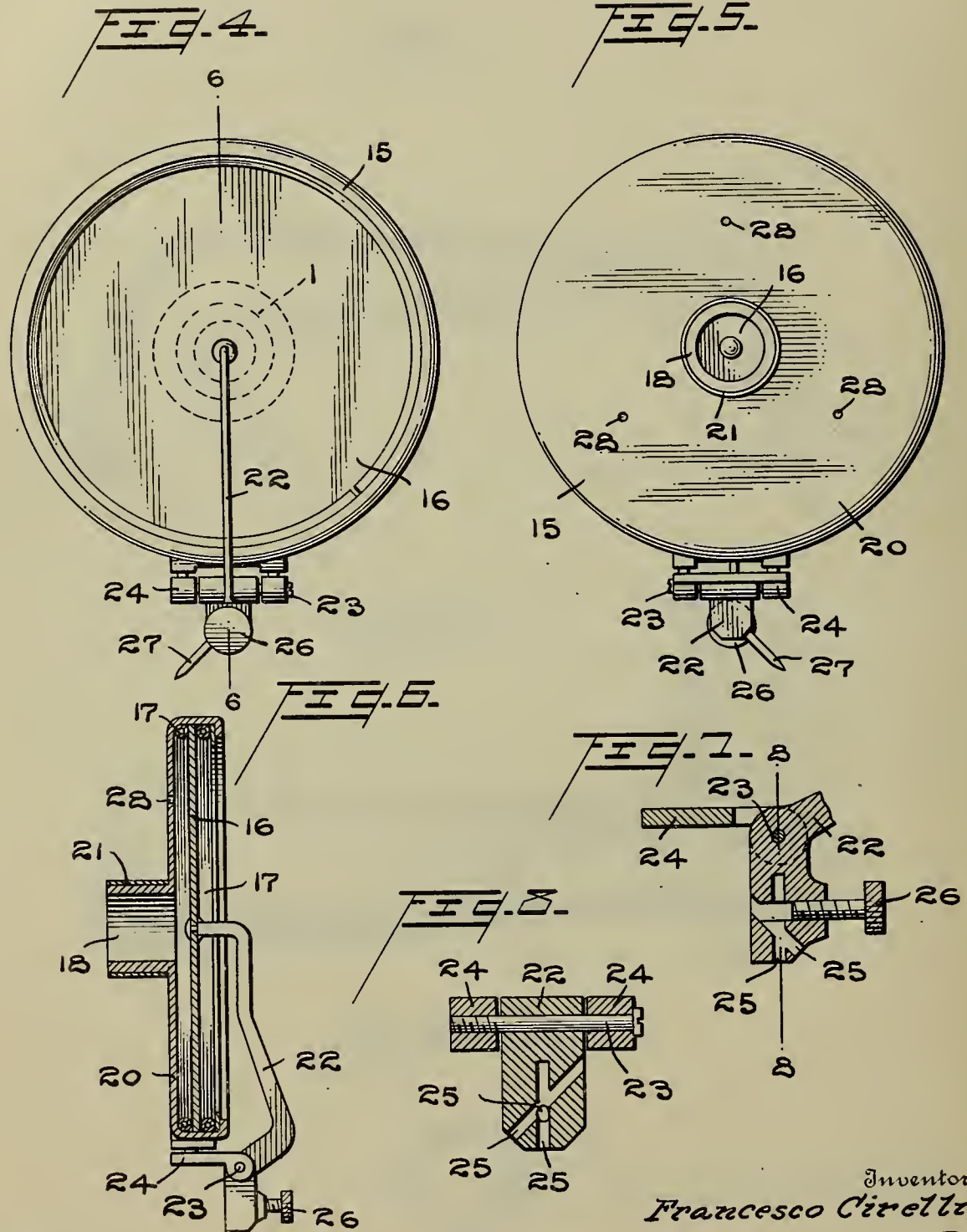
Inventor
Francesco Cirelli,
By *Joshua R. H. Potts*
his Attorney



F. CIRELLI.
TALKING MACHINE.
APPLICATION FILED APR. 22, 1915.

1,167,796.

Patented Jan. 11, 1916.
2 SHEETS—SHEET 2.



Witnesses
L. R. Ziegler
b. R. Ziegler.

Inventor
Francesco Cirelli,
By *Joshua R. H. F. H.*
his Attorney

UNITED STATES PATENT OFFICE.

FRANCESCO CIRELLI, OF PHILADELPHIA, PENNSYLVANIA.

TALKING-MACHINE.

1,167,796.

Specification of Letters Patent.

Patented Jan. 11, 1916.

Application filed April 22, 1915. Serial No. 22,995.

To all whom it may concern:

Be it known that I, FRANCESCO CIRELLI, a subject of the King of Italy, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to improvements in talking machines, the object of the invention being to provide an improved construction of talking machine which may be used in connection with various styles of records, and provide improved means whereby the sound box may be located at either of two positions relatively to the tone arm.

A further object is to provide improved means for supporting the stylus at any angle desired, whereby the tone may be softened or increased as desired.

A further object is to provide an improved construction of sound box having openings therein, and capable of adjustment relatively to the tone arm to position the stylus at the angle desired.

A further object is to provide an improved construction of stylus bar adapted to support a needle at various angles and positions employing a single set screw to secure the stylus in any of its operating positions.

With these and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings: Figure 1 is a view in longitudinal section through my improved tone arm. Fig. 2 is a fragmentary view on an enlarged scale partly in plan and partly in section through the free ends of the tone arm. Fig. 3 is a view in section on the line 3—3 of Fig. 2. Fig. 4 is a view in elevation of the outer face of the sound box. Fig. 5 is a similar view of the inner face of the sound box. Fig. 6 is a view in section through the center of the sound box taken on the line 6—6 of Fig. 4. Fig. 7 is an enlarged view in section through the lower portion of the stylus bar, and Fig. 8 is a view in section on the line 8—8 of Fig. 7.

1 represents my improved tone arm having a semi-spherical enlargement 2 at its larger end connected by a coupling ring 3

with a stationary ring 4, so that the tone arm 1 is permitted a rotary movement, and also a pivotal or vibrating movement to readily conform to the variations in the record groove.

I have not attempted to illustrate any particular form of talking machine, as I would have it understood that my improvements are adapted for any type of machine, and hence the reference numeral 5 indicates a support which may constitute the ordinary box, and 6 is a rotary record disk such as commonly employed in talking machines.

The free end of the tone arm 1 is provided with a lateral tubular extension 7 and a cylindrical slide 8 fits the extension and is provided with a closed inner end 9 adapted to close communication between the extension and the tone arm when said slide is in its outward position shown in Fig. 2.

The slide 8 is open at its outer end, and is provided with an opening 10 in its side adjacent its inner end, so that when the slide is in its inner position, it serves to cut off the open end 11 of the tone arm and open communication between the extension 7 and the tone arm for a purpose which will hereinafter appear.

12 represents a button which is secured to the slide 8, and is movable in a slot 13, and the tone arm adjacent its open end 11, is provided with a recess 14 to accommodate the end 9 of slide 8 when the latter is in its inward position.

15 represents my improved sound box which is relatively thin, and which is provided with a metal diaphragm 16 secured between packing rings 17.

18 is a nipple projecting centrally from the rear wall 20 of the sound box, and adapted to be positioned either in the opening 11 in the end of tone arm 1, or in the open end of the extension 7 as will be hereinafter explained. To provide a tight frictioned juncture between the nipple and the tone arm, I locate a gasket 21 around the nipple.

22 represents a stylus bar connected to the center of diaphragm 16, and adjacent its lower end pivotally connected by a pin 23 with a bracket 24 fixed to the bottom of the sound box. The extreme lower end of the stylus bar is provided with a plurality of recesses 25. Certain of these recesses are at an angle, while one of the recesses is verti-

cally positioned, and a single set screw 26 is located in the stylus bar, and is adapted to extend across all of the said recesses 25.

27 represents an ordinary needle or stylus 5 which may be positioned in any of the recesses 25, and secured in any of them by the set screw 26. This plurality of recesses enables the stylus to be located either vertically or at any particular angle relatively 10 to the sound box, and to the record disk.

I have found that by changing the angle of the stylus, variations may be had in the tone and in order to provide a wide range of such angular adjustment, I so firmly 15 couple the nipple 18 in the tone arm 1 or extension 7 thereof that the sound box can be turned in either direction, and thereby vary the angle of the stylus. This can be readily understood by reference to Fig. 4, 20 in which it will be noted that by turning the sound box, the angular disposition of the stylus can be varied. I have also discovered that with a sound box such as I have illustrated, improvement in the tone 25 may be had by providing relatively small openings 28 in the rear wall 20 of the box.

With certain types of machines and records therefore, it is desirable to have the sound box parallel to the tone arm. With 30 such machines the sound box will be positioned in the extension 7, the slide 8 being located in its innermost position, cutting off the open end 11 of the tone arm. With other machines and records, it is desirable 35 to have the sound box at the end of the tone arm in which position the box will be at right angles to the tone arm. Under such conditions, the nipple 18 will be located in the opening 11 of the tone arm, and the 40 slide 8 will be in its outward position as shown in Fig. 2.

It will therefore be noted that with my improved construction, the parts can be arranged in accordance with various kinds 45 of records, and hence my improved machine is available for use in connection with almost any kind of record which can be purchased on the market.

Various slight changes might be made in 50 the general form and arrangement of parts described without departing from my invention, and hence I do not limit myself to the precise details set forth, but consider

myself at liberty to make such changes and alterations as fairly fall within the spirit 55 and scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a tone arm hav- 60 ing an opening at one end, an extension projecting at an angle thereto, a slide in the extension adapted to cut off either the extension or the open end of the tone arm, and a sound box adapted to be supported 65 in the extension or the end of the tone arm, substantially as described.

2. The combination with a tone arm having an opening at one end, an extension projecting at an angle thereto, a slide in the ex- 70 tension adapted to cut off either the extension or the open end of the tone arm, a sound box adapted to be supported in the extension or the end of the tone arm, and said sound box having rotary adjustment 75 in either of its positions, substantially as described.

3. The combination with a tone arm having a lateral extension adjacent its open end, a hollow slide mounted in the exten- 80 sion having a closed inner end and an open outer end, said slide having an opening in its side adjacent its closed inner end, said extension having a longitudinal slot therein, and a button secured to the slide and projecting 85 through the slot, substantially as described.

4. The combination with a tone arm having a lateral extension adjacent its open end, a hollow slide mounted in the exten- 90 sion having a closed inner end and an open outer end, said slide having an opening in its side adjacent its closed inner end, said extension having a longitudinal slot therein, a button secured to the slide and projecting 95 through the slot, a sound box, and a nipple on the sound box constructed to fit the end of the extension and the end of the tone arm, substantially as described.

In testimony whereof I have signed my 100 name to this specification in the presence of two subscribing witnesses.

FRANCESCO CIRELLI.

Witnesses:

CHAS. E. POTTS,
MARIE JACKSON.

SOUND REPRODUCING MACHINE,
1,167,838-----J. T. Prout,
Patented-Jan. 11, 1916.
Filed-Oct. 18, 1913.

J. T. PROUT.
SOUND REPRODUCING MACHINE.
APPLICATION FILED OCT. 18, 1913.

1,167,838.

Patented Jan. 11, 1916.

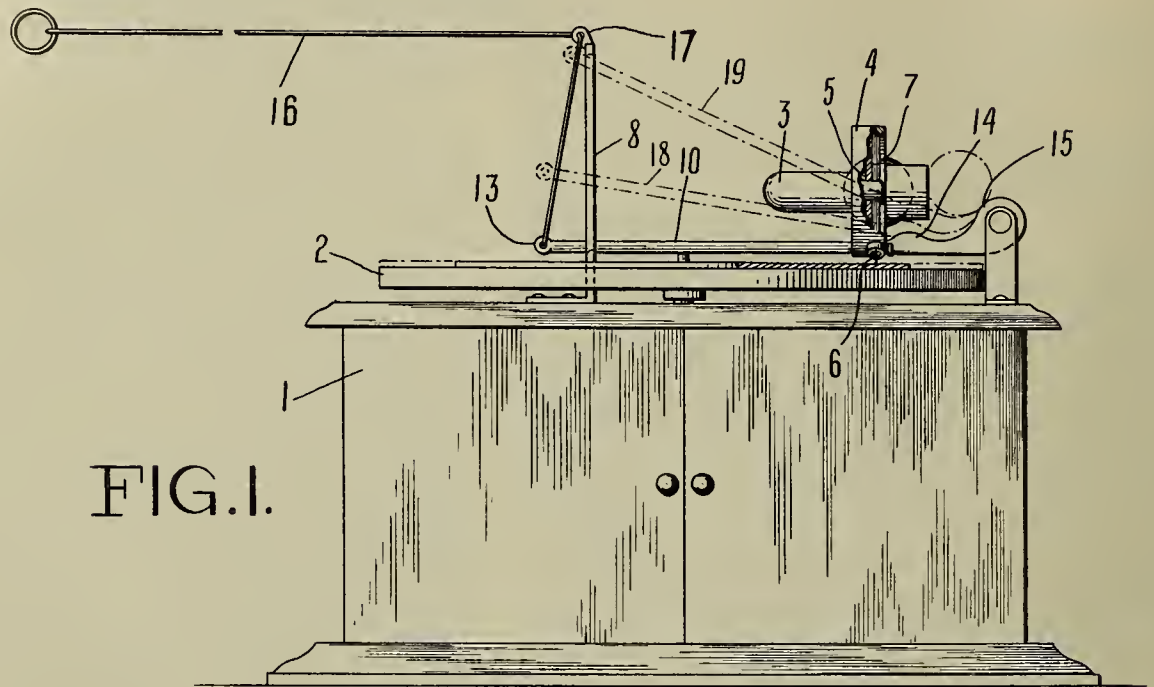


FIG. 1.

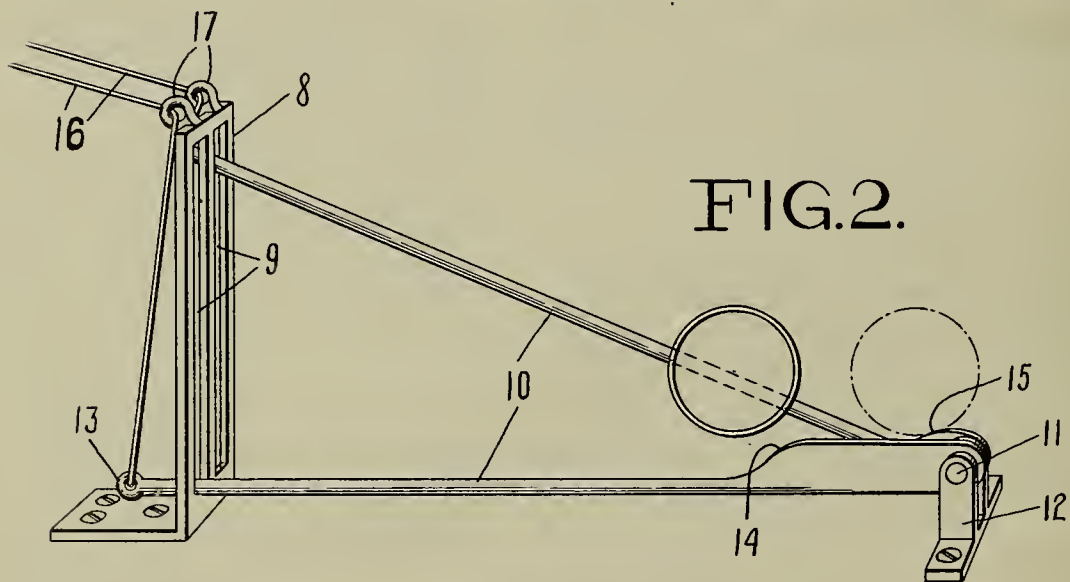


FIG. 2.

Witnesses:
Arthur Choquet
Wm C. Dunn

John T. Prout,
Inventor
By his Attorney
William R. Hammond

UNITED STATES PATENT OFFICE.

JOHN T. PROUT, OF NEW YORK, N. Y.

SOUND-REPRODUCING MACHINE.

1,167,838.

Specification of Letters Patent.

Patented Jan. 11, 1916.

Application filed October 18, 1913. Serial No. 795,846.

To all whom it may concern:

Be it known that I, JOHN T. PROUT, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following, taken in connection with the accompanying sheet of drawings, is a full, clear, and concise description.

My present invention relates more particularly to certain improved attachments for sound reproducing machines, whereby said machines are rendered of greatly increased efficiency.

According to my invention, I am enabled after the inauguration of the operation of the machine to reset the tone arm so that the record in use may start anew. This may be accomplished irrespective of the distance that the stylus has traversed along the effective zone of the disk, that is to say—I may permit the record to be entirely played and then be repeated, or I may permit the record to be partially played and then return the stylus any predetermined distance and that portion already gone over be traversed again by the stylus. The mechanism whereby this is accomplished is of extreme simplicity and may be so designed as to be used in conjunction with records of varying diameters.

In the accompanying sheet of drawings, in which like reference characters are employed to designate like parts throughout the respective views: Figure 1 is a view in side elevation of a sound reproducing machine embodying the features of my invention. Fig. 2 is a detail perspective view showing the resetting mechanism.

In detail, 1 indicates the conventional form of sound reproducing machine which includes a rotating disk carrier 2, tone arm 3, sound box 4, containing a diaphragm 5 and a stylus carrier 6, all of which are of usual and well known construction.

According to my invention, a record partially or fully played may be replayed or started over again without manually lifting and resetting the tone arm, which requires considerable care. This is desirable where a favorite record is being played and it is desired to repeat it one or more times or where a portion of a given record is pleasing and it is desired to replay that portion. To accomplish this, I mount upon the stand

or box 1, an upright 8. This upright is provided with one or more slots or guide eyes 9, in which a resetting arm 10 is guided in its vertical movement. The resetting arm 10, supported on a pivot 11 is journaled in a standard 12, the latter mounted fast or supported on a relatively different part of the box 1. The arm 10 is positioned beneath the tone arm 3 permitting the latter to move in traversing the record. In operation the tone arm is moved back to its initial starting position by its engagement with the arm 10. This is accomplished by the means of a pull string 16 which is threaded through a suitable guide eye 17 at the top of the support 8 one end being fast to the end 13 of the resetting arm 10. A pull upon string 16 causes the resetting arm 10 to oscillate around its pivot 11 engaging the tone arm 3 raising it from the record or disk, and then guiding the same in its descent to the initial or starting point which it reaches through gravity. As explained, this can be performed at any point desired during the traversing of the record by the stylus. The guide arm 10 is provided with a stop portion 14 or 15 which arrests the downward movement of the tone arm at the proper starting position with respect to the effective zone of the record. Where a record of small diameter is used, the reset arm is provided with a stop portion similar to that of 14 and where a record of larger diameter is used the reset arm is provided with a stop portion similar to 15, the latter permitting a greater descent of the tone arm in its resetting movement.

In order that my resetting mechanism may be adapted to cooperate with sound records of different diameters, I may provide two resetting pivoting members, each provided with a limiting stop so positioned with respect to the outer circumference of the record that it will bring the sound arm to rest with the stylus at the outer or first groove of said record, or I may as shown in Fig. 1 provide a single pivoted arm with differential stops so that by imparting different degrees of movement to the pivoted member, the tone arm will through gravity be forced to move the proper distances; for instance, by exerting a partial pull on the draw string, the pivoted member will ascend to its first dotted position indicated at 18; by exerting a further pull on the draw string, the pivoted member will ascend to

the dotted position indicated at 19. Of course, when the pivoted member ascends the tone arm likewise descends until the stylus engages the first groove of the sound record.

Of course, it will be understood that various changes and modifications may readily be resorted to without departing from the spirit and scope of the invention. For instance, for the purpose of greater strength and rigidity, a bridge-like formation may be imparted to the support, instead of using a single upright such as illustrated and where the shank holding the needle is not rigid, a double clamp may be employed.

Other similar details and changes may also be employed or equivalents used and still be within the scope of the following claims.

Having thus described my invention, what I claim as new herein and desire to secure by Letters Patent is:

1. A resetter for sound producing machines comprising in combination with the sound arm and stylus, a pivoted member, a vertical supporting guide, and a pull member fastened to the pivoted member and co-operating with the vertical supporting guide to oscillate the pivoted member enabling the latter to raise the sound arm, to return the stylus through gravity to its point of beginning on the effective zone of the sound producing record.

2. A resetter for sound producing machines comprising a pivoted member provided with a limiting stop, a vertical guide support provided with a slot through which the pivoted member projects, a guide provided at the top of the vertical support, and an operating member connected to the pivoted member and threaded through the

guide for operating the pivoted member, substantially as described.

3. A resetter for sound producing machines comprising, in combination with the sound arm and stylus, flexible means co-operating with the sound arm and capable of manipulation to return the stylus any desired distance at any time after the inauguration of its movement over the effective sound producing zone of the record at the will of the operator in order to repeat the portion of the record desired.

4. A resetter for sound producing machines comprising, in combination with the sound arm and stylus, a member co-operating with the sound arm, a flexible member co-operating with, and adapted to operate said first member and capable of manipulation to return the stylus any desired distance at any time after the inauguration of its movement over the effective sound producing zone of the record, at the will of the operator.

5. A resetter for sound producing machines comprising, in combination with the sound arm and stylus, a pivoted arm co-operatively associated with the sound arm, and a flexible member co-operating with the pivoted arm which, when manually operated, will return the sound arm and stylus any desired distance at the will of the operator to enable the stylus to retrace any portion or all of the record over which the stylus has previously moved.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN T. PROUT.

Witnesses:

ARTHUR CHOQUET,
ANNA KEELEY.

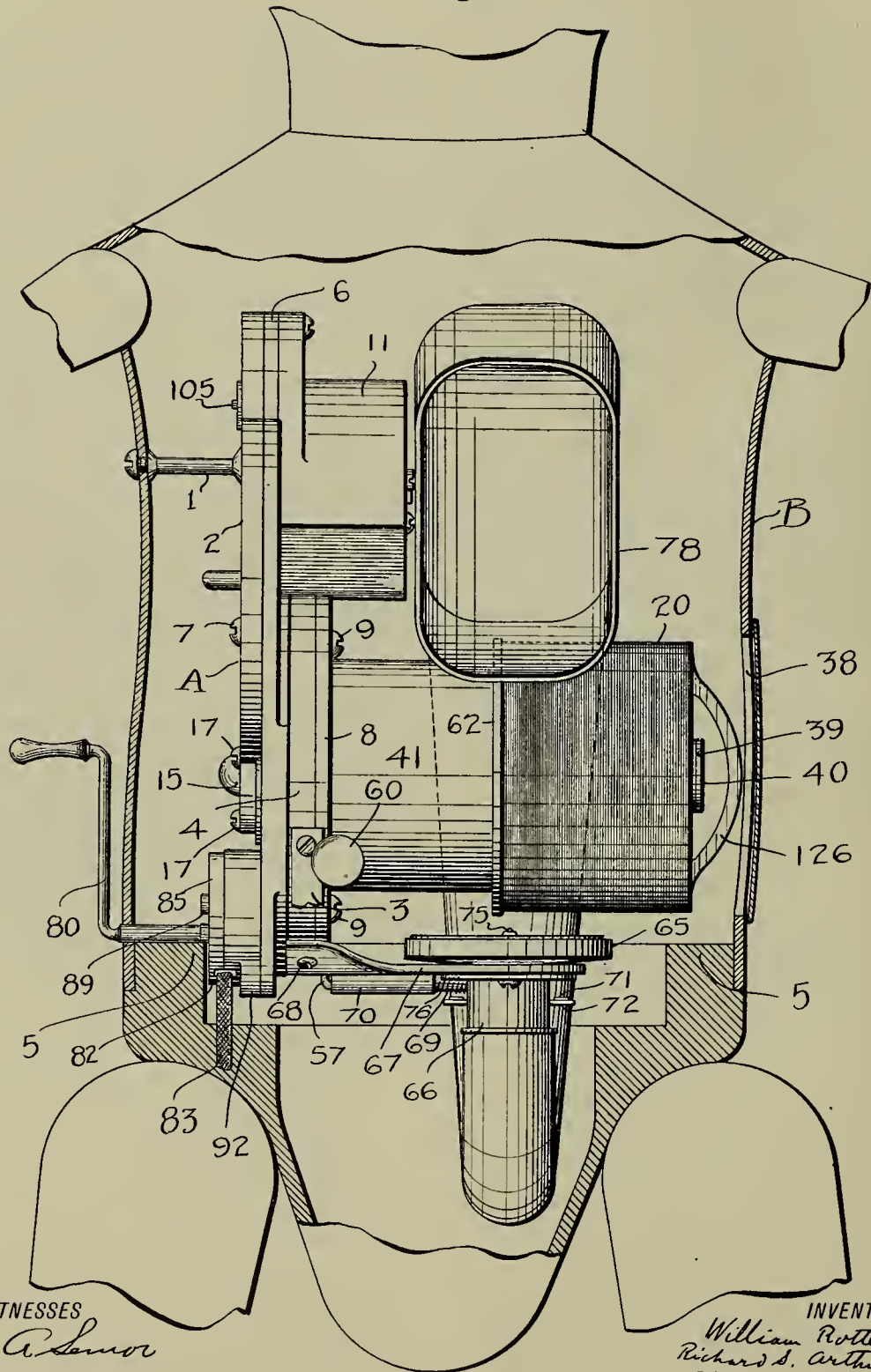
PHONOGRAPH MECHANISM,
1,167,842-----W. Rotter & R.S.Arthur,
Patented-Jan 11, 1916.
Filed-July 1, 1914.

W. ROTTER & R. S. ARTHUR.
 PHONOGRAPH MECHANISM.
 APPLICATION FILED JULY 1, 1914.

1,167,842.

Patented Jan. 11, 1916.
 7 SHEETS—SHEET 1.

Fig. 1.



WITNESSES
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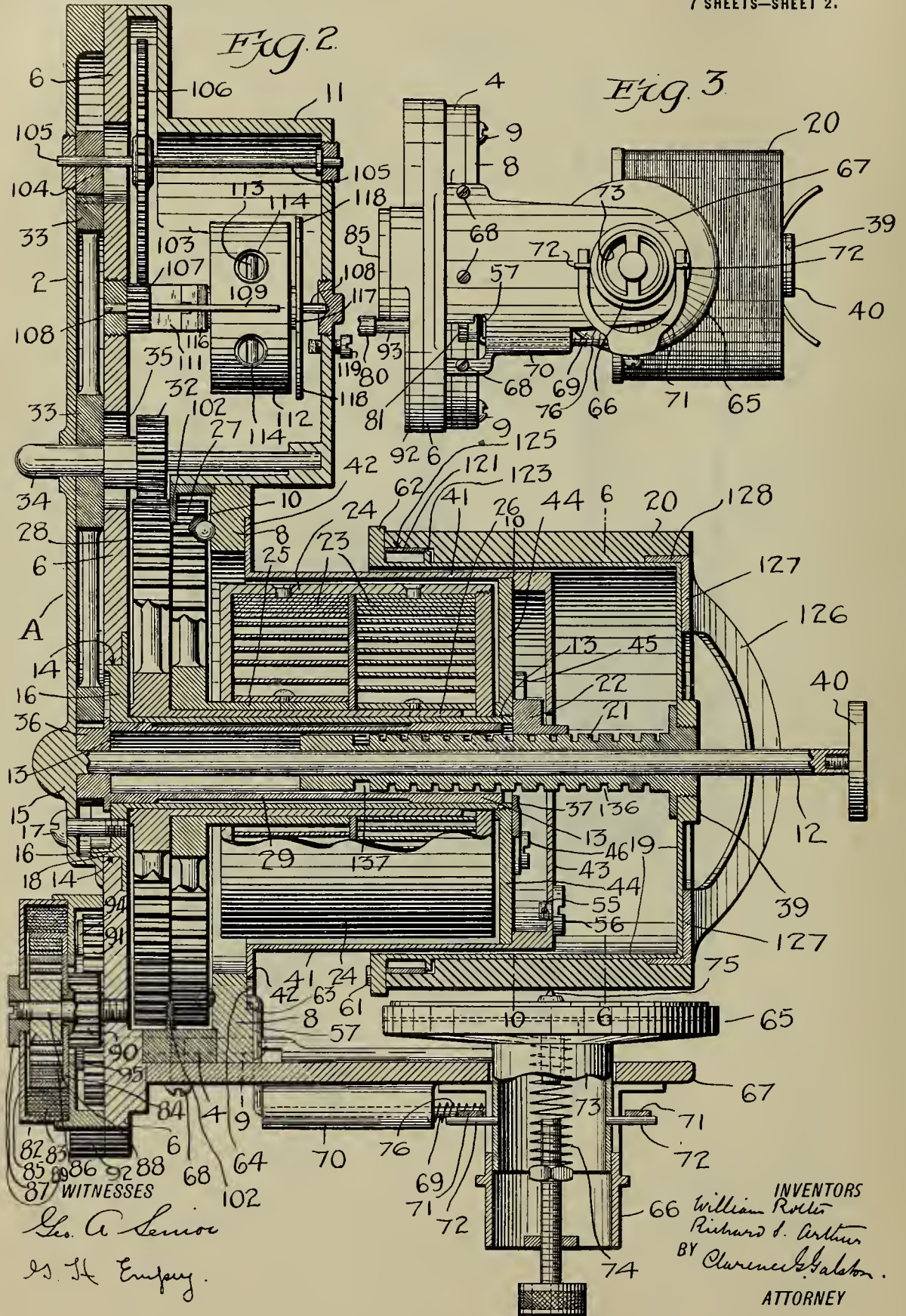
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W. ROTTER & R. S. ARTHUR.
 PHONOGRAPH MECHANISM.
 APPLICATION FILED JULY 1, 1914.

1,167,842.

Patented Jan. 11, 1916.

7 SHEETS—SHEET 2.

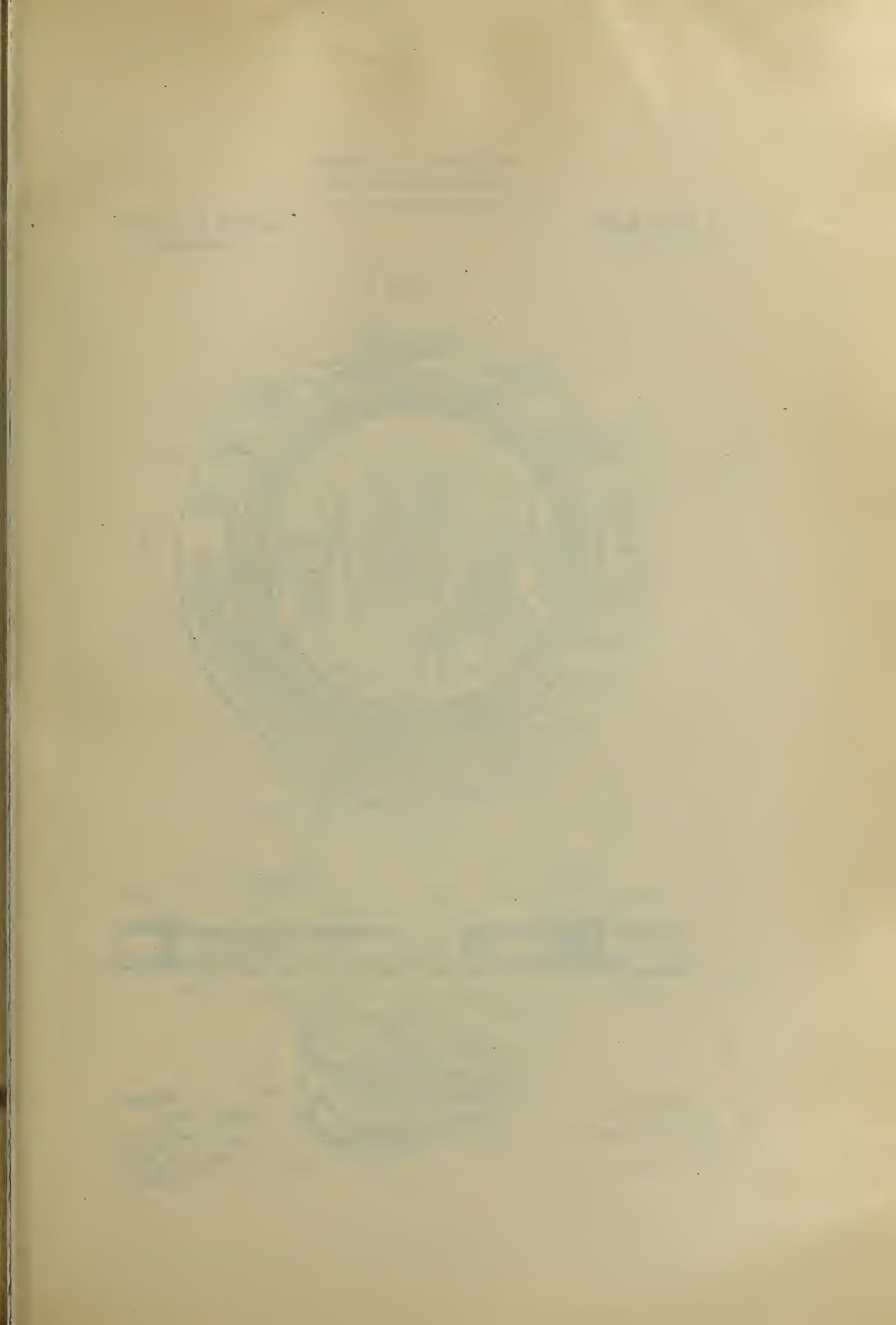


1,167,842.

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 7 SHEETS—SHEET 4.

Fig 6

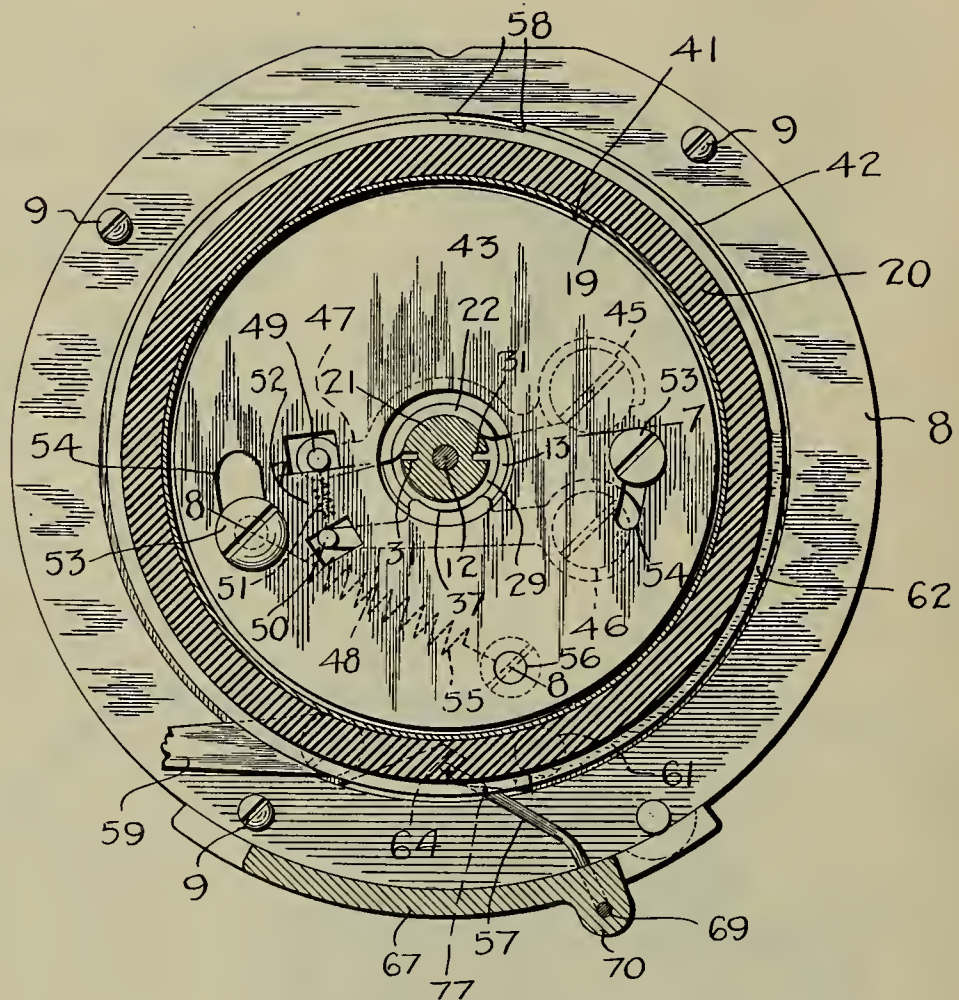


Fig 7

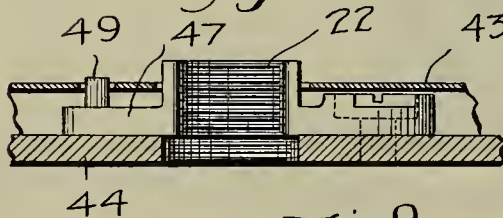


Fig 8

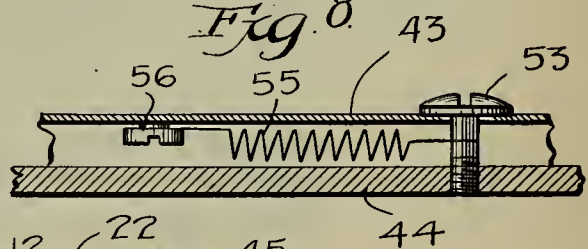
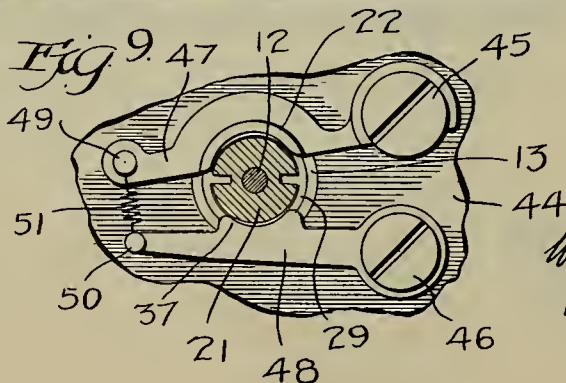


Fig 9



WITNESSES

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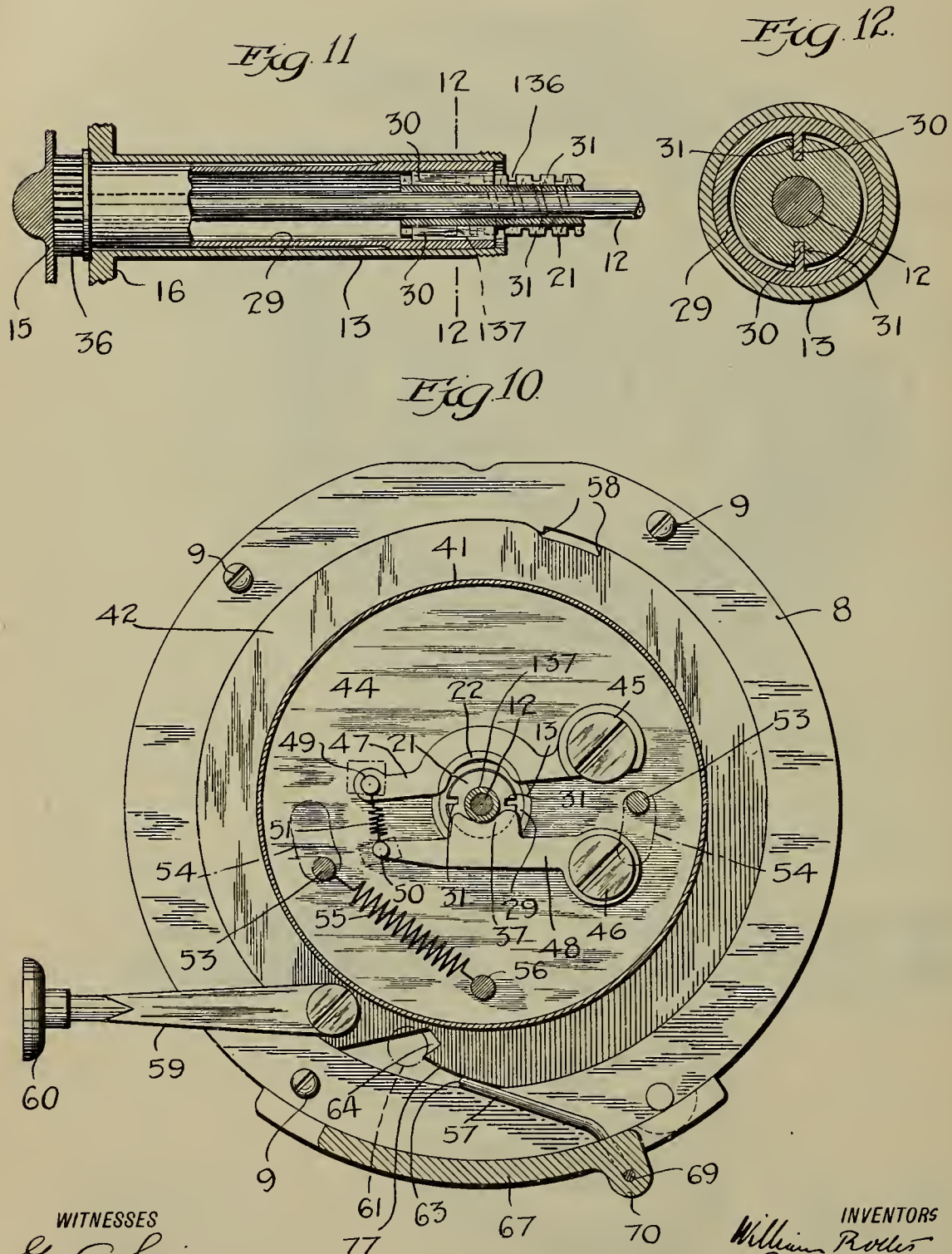
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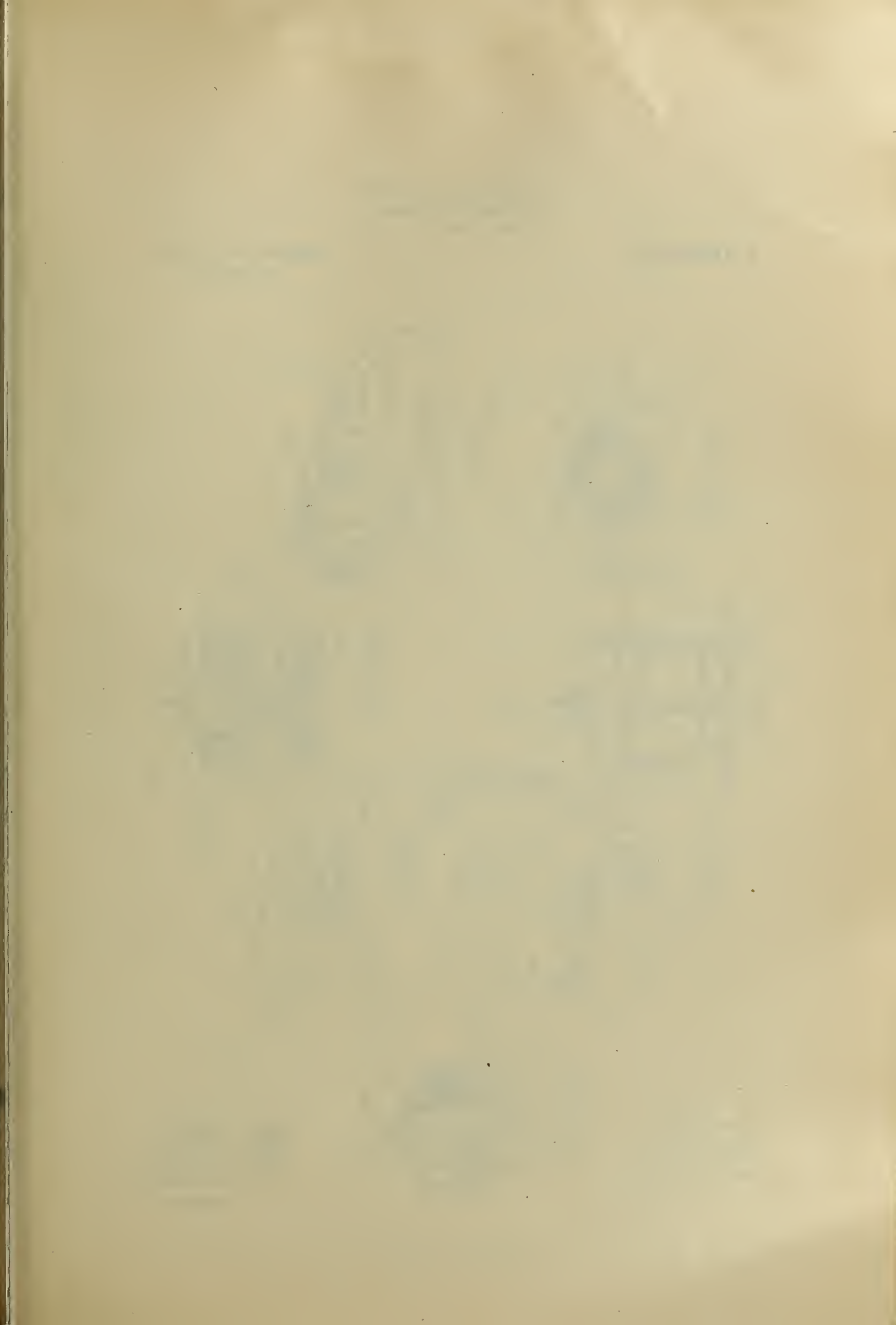
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7 SHEETS—SHEET 5.



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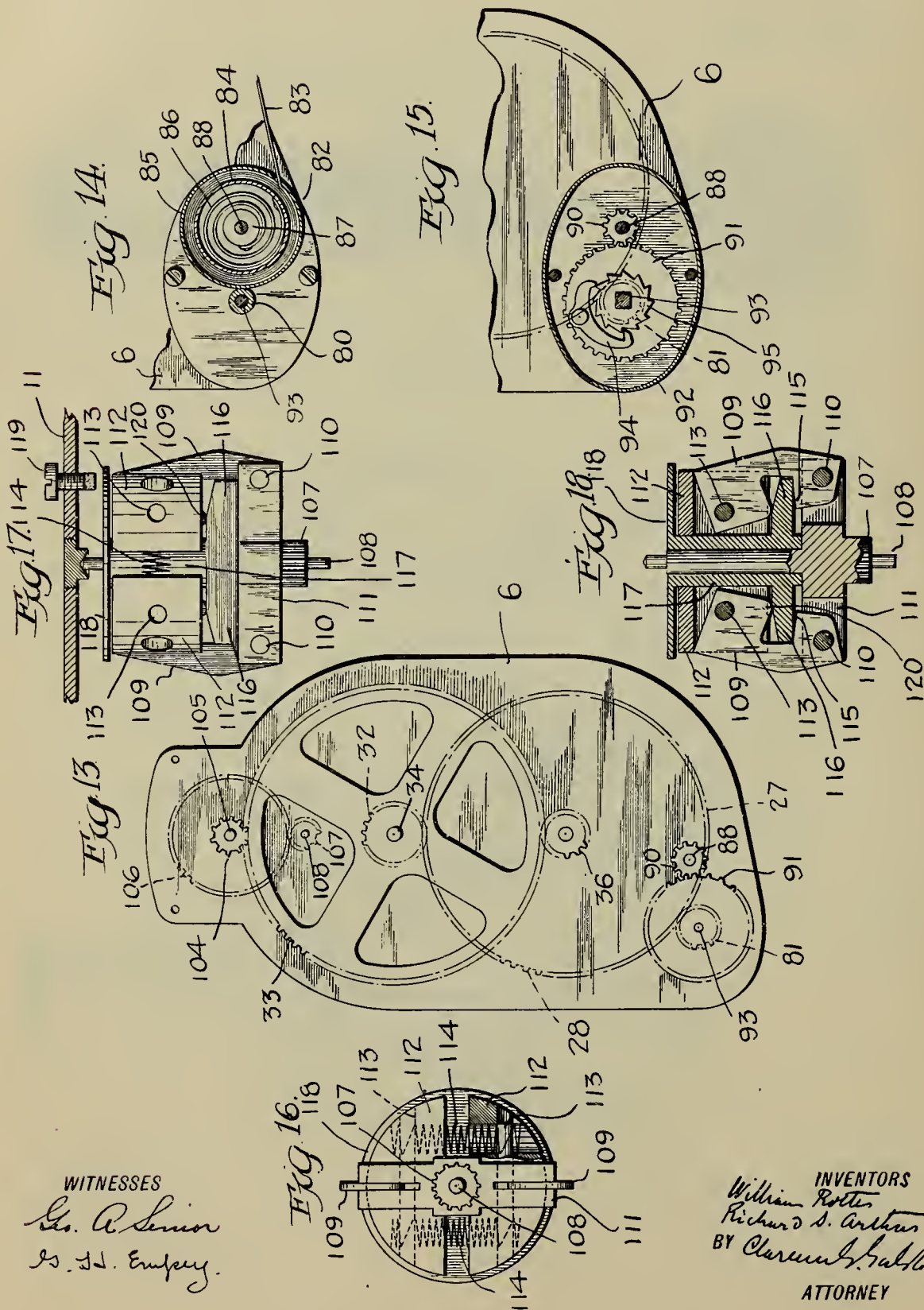


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1,167,842.

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7 SHEETS—SHEET 6.



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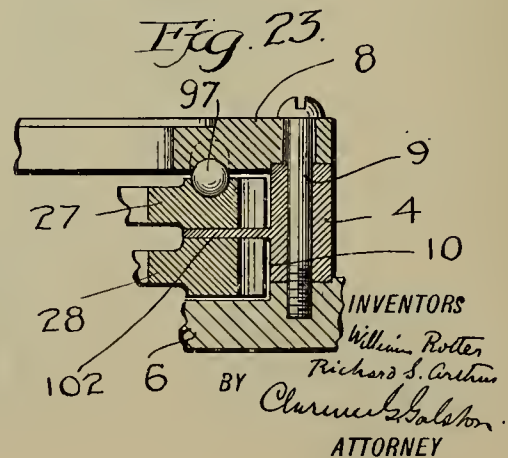
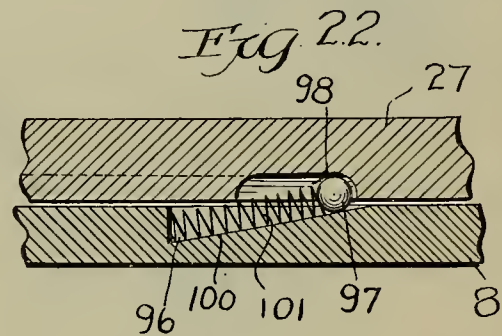
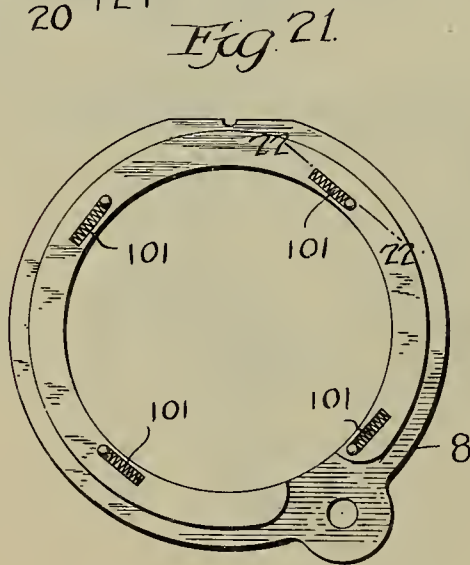
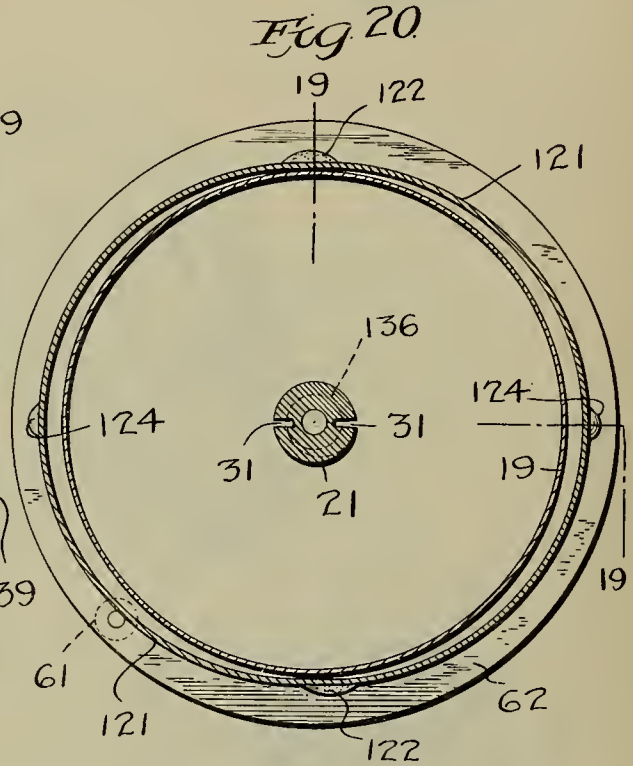
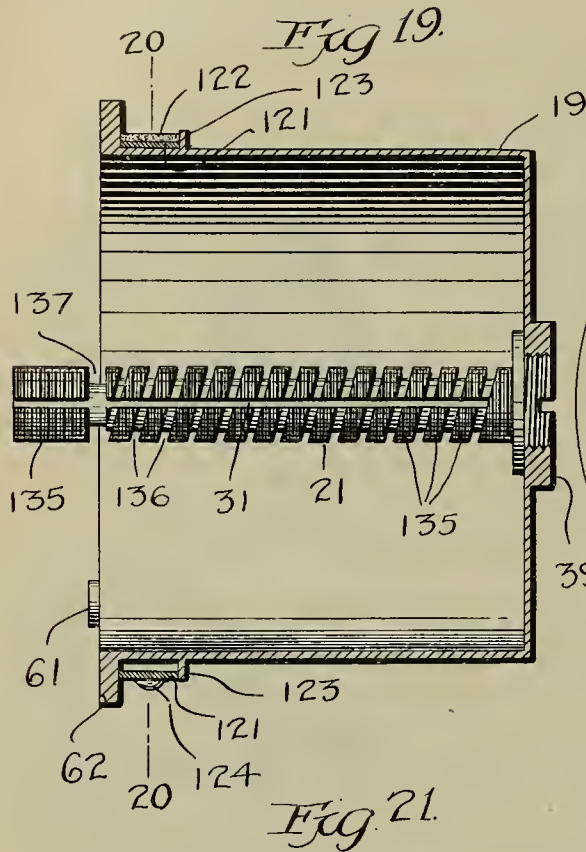
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7 SHEETS—SHEET 7.



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UNITED STATES PATENT OFFICE.

WILLIAM ROTTER AND RICHARD S. ARTHUR, OF NEW YORK, N. Y., ASSIGNORS TO
TALKING DOLL & NOVELTY COMPANY, INC., OF NEW YORK, N. Y.

PHONOGRAPH MECHANISM.

1,167,842.

Specification of Letters Patent.

Patented Jan. 11, 1916.

Application filed July 1, 1914. Serial No. 848,340.

To all whom it may concern:

Be it known that we, WILLIAM ROTTER and RICHARD S. ARTHUR, residents of the borough of Bronx, city of New York, county of Bronx, and State of New York, citizens of the United States, have invented an Improvement in Phonograph Mechanism, of which the following is a specification.

The invention comprises certain improvements in phonograph mechanism, having as objects, among others, to effect a material simplification of such mechanisms, to secure compactness in the construction and relation of the elements, to insure strength and rigidity in the structural parts,—more especially in apparatus where the mechanism is carried in projecting relation from a support,—to enable the apparatus to be quickly and easily assembled and parts to be readily replaced in event of breakage, to render it in a high degree automatic without introducing complications, to facilitate the insertion and removal of records, and to make the apparatus proof against meddlesome or unskilled manipulation.

A highly important feature of the invention resides in the co-axial relation of the parts, whereby, in particular, the record or record support is rotatable around the spring driving means, thus making possible a substantial economy in the amount of space occupied; and, while the invention is more particularly concerned with mechanisms of the cylinder record type, it will be understood that the said feature is not necessarily limited thereto.

Another leading feature is the construction of the thread-bar with a reverse or return thread, in addition to the feed thread, together with means whereby this thread operates automatically to restore the record drum or reproducer, though preferably the former, to normal position upon conclusion of the playing of the record. A feed-nut and a dog cooperate with the double-thread feed-bar, the dog to engage the return thread, which is deeper and steeper than the regular thread; and means are provided for causing these members to engage alternately with the respective threads the nut being disengaged and the dog engaged, automatically at

the end of playing. A simple and effective form of device reliably holds the records on the drum and permits their insertion and removal merely by slipping them on and off, the possibility of error in placing the wrong end over the drum being also eliminated.

These and numerous other important features and principles will become apparent to those skilled in the art as the specification proceeds.

The mechanism is more particularly designed for installation in small form in dolls or other toys, clocks, etc., as illustrated for example in Figure 1 of the accompanying drawings, its compact and sturdy construction, its ability to perform equally well in any position, and the simplicity of its operation especially fitting it for such uses. It will be manifest, however, that the apparatus may be made on a larger scale, and that part or all of its features may be applied with advantage in numerous specifically different ways, for example, in the production of so-called hornless or cabinet machines of small size or of variable external shapes and proportions.

A feature of the mechanism which contributes to the flexibility of external design as well as to the securing of desirable acoustic effects, consists in the possibility of disposing the reproducer at any or various points around the record drum, together with the consequent freedom in the matter of the disposition of the sound conveyer or amplifier. In the particular instance herein shown the reproducer is located below the record drum, while the sound conveyer extends around and above the same, though it will be understood that this orientation is not necessarily fixed, since in the case of a talking doll, for example, the mechanism as a whole may be disposed in any position according to the manner in which the doll is held.

In the accompanying drawings illustrating the invention by means of the embodiment at present believed to be preferable for use in dolls: Fig. 1 is a front elevation of the mechanism in the body of a doll, the doll body being partially sectioned and partially broken away; Fig. 2 is a vertical sec-

tion through the mechanism, taken in the plane of its main axis, the scale being considerably larger than that of Fig. 1; Fig. 3 is a bottom plan view of the mechanism, on the scale of Fig. 1; Fig. 4 is an elevation looking at the right-hand end of Fig. 1; Fig. 5 is a reverse end elevation; Fig. 6 is a section on the line 6—6 of Fig. 2; Figs. 7 and 8 are sections on the lines 7—7 and 8—8 of Fig. 6; Fig. 9 is a fragmentary elevation showing the feed-nut and return dog in midposition, wherein the thread-bar is free to be withdrawn; Fig. 10 is a section on the line 10—10 of Fig. 2; Fig. 11 is a detail view showing the central portion of the mechanism partly in section in the plane of the axis and partly in elevation; Fig. 12 is an enlarged cross-section on the line 12—12 of Fig. 11; Fig. 13 is an elevation of the supporting wall, indicating the gearing in a semi-diagrammatic manner; Figs. 14 and 15 are detail sectional views illustrative of the spring tape winder; Fig. 16 is an end view of the governor, partly broken away and in section; Fig. 17 is a side elevation of the governor; Fig. 18 is a central longitudinal section therethrough; Fig. 19 is a section on the line 19—19 of Fig. 20; Fig. 20 is a cross-section through the record drum on the line 20—20 of Fig. 19; Fig. 21 is an inner face view of the plate bearing the balls which hold the winding gear against reverse movement; Fig. 22 is an enlarged section on the line 22—22 of Fig. 21, representing the winding gear; and Fig. 23 is a detail sectional view showing the winding and driving gears and one of the ball devices.

In the particular embodiment of the invention illustrated in these views, the supporting part of the mechanism consists in the main of an upright wall or flat casing structure A, which may, however, be disposed horizontally, as a base or platform, or in any other manner. As more particularly illustrated in Fig. 1, it may be fixed within the body B of the doll by means of a stud 1 connecting a cover plate 2, forming part of the structure, with one side of the doll body, and brackets 3 secured to an annular plate 4, also part of the structure and bearing upon a suitable ledge or shoulder 5 in the torso of the doll. Manifestly the form and location of the connections for holding the supporting structure in place may be widely varied. Such supporting structure preferably comprises a wall or plate 6 having gear casings at opposite sides, the cover plate 2, which is hollow, cooperating with the plate to which it is secured by screws 7 to form an outer casing, and annular plates 4 and 8 secured by screws 9 to the inner side of the main plate forming a gear casing 10. A governor casing 11 is shown disposed at the same side as the gear casing 10 and above the latter, but it may be positioned elsewhere

if desired with a slight rearrangement of the gearing.

A central axle or fixed shaft 12 and a hollow axle or shaft 13 extending from the supporting structure constitute projecting bearing means for supporting the main elements of the mechanism. The wall 6 is provided with an opening 14. The fixed ends of the central and hollow axles are provided with a cap and basal portion 15 and 16, respectively, which clamp against opposite sides of the plate around this opening and are drawn together by means of screws 17. The basal portion 16 has a partially cylindrical flange 18 which fits the said opening and the interior of the cap 15, so as to center the parts. The cap 15, which is hollow and set into a cut-away portion of the cover plate 2, cooperates with this cover plate and with the basal portion 16 to form an extension of the external gear casing, the wall of the cap and the flange 18 being appropriately cut away at the junction with the cover plate 2.

The central axle 12 bears the record support 19, and the hollow or outer axle 13 supports the spring driving means therefor. The record 20 is preferably of the cylinder type, and the record support is in the form of a hollow drum or cylinder. The inner axle projects beyond the outer axle a distance approximately equal to the length of the drum. The drum is secured to and encircles a thread-bar 21, which is rotatable and slidable on the axle 12 and cooperates with a feed-nut 22 to feed the record from the starting position shown in Fig. 1 inward over the spring driving means.

The driving spring 23, preferably of the tandem variety, is housed within a spring barrel 24, to which the outer ends of the two halves of the spring are secured, their inner ends being secured, respectively, to concentric sleeves 25 and 26 turning about the hollow axle 13, one end of the spring barrel being journaled on the sleeve 25 and the other end thereof on the outer part of the hollow axle. Winding and driving gears 27 and 28, respectively, are fixed to the sleeves 25 and 26 and are housed within the gear casing 10.

The central opening through the spring driving means and within the hollow axle 13 accommodates a driving connection or telescopic shaft, consisting, in the present instance, of the thread-bar or spindle 21 and a rotary sleeve 29, the latter journaled on the inner surface of the hollow axle 13. The thread-bar 21 has driving engagement with the sleeve 29, but is free to slide axially with reference thereto by means of one or more feathers 30 projecting inward from the sleeve in engagement with splines or grooves 31 formed longitudinally in the exterior of the thread-bar crossing the threads thereof (see Figs. 11 and 12). The sleeve 29 is

driven by means of a pinion 32 meshing with the driving gear 28 and compounded with a gear 33 on a shaft 34 which passes through an opening 35 in the wall 6, the gear 33 being housed by the cover plate 2 and meshing with a pinion 36 fixed to the end of the sleeve within the chamber between the cap 15 and the part 18. An outward extension on the shaft 34 may be used to drive connections leading to associated mechanisms if desired.

The thread-bar, see Figs. 11-19, has, in addition to the ordinary fine thread 135 for feeding purposes, a deeper thread 136 of much steeper pitch than the feed thread and running in the reverse direction. This thread coöperates with a dog 37 at the end of the playing of the record, the feed-nut 22 being simultaneously disengaged from the fine thread, so that by the continued rotation of the record support in the same direction as previously, the record and its support are caused to move outward to normal position, where the record may be removed and a new one inserted onto the drum through an opening 38 in the side of the doll provided for the purpose. In this operation the engagement of the dog 37 with the return thread opposes the thrust exerted by pushing the record onto its support, and thus holds the latter against displacement. When the record drum is returned to starting position, in the manner described, the mechanism is automatically stopped by the frictional engagement of a surface 39 on the outer end face of the drum with the inner face of a brake disk 40, which is screwed to the end of the fixed axle, this disk also preventing the record support from slipping out. The return thread preferably terminates in an annular groove or transverse channel 137, which may be even deeper than the thread, the parts being so proportioned that the return dog enters the groove 137 at the moment when the outward travel of the drum causes it to press frictionally against the brake disk, so that the drum is held firmly against the brake and is enabled to offer even firmer resistance to the thrust of the insertion of a new record than it would if the dog were still in the spiral portion of the return groove when the mechanism is brought to rest. The feed-nut 22 and the return dog 37 are also received within the record drum, being preferably located at the outer or forward end of the spring driving means; and their engagement and disengagement with the threads of the thread-bar are effected by means extending between the spring motor and the drum and also adapted to be encircled by the latter, the said means being most advantageously in the nature of an oscillatory member coaxial with the spring motor, the record support and their shafts. In the preferred

construction illustrated in the drawings, the said member consists of a cup 41 inclosing the spring barrel and having a basal flange 42 which is rim journaled in a circular recess in the outer face of the plate 8 of the gear casing 10. The nut and dog are housed between the end wall 43 of the cup and the end of the spring barrel, or between the said wall and a fixed plate 44 screwed to the outer end of the hollow axle and constituting the support for the said members, which are pivoted thereto at 45 and 46, respectively, as shown more particularly in Figs. 6, 7, 10. The nut and dog also have connection with the movable wall 43 of the cup, so that they are shifted into and out of engagement with the threads of the thread-bar by the relative movement between the parts 43 and 44, it being manifest that in the construction illustrated the same results may be secured irrespective of which of the two parts supports the nut and dog, provided these elements have connection with both.

As shown more particularly in Figs. 9 and 10, the nut and dog are fixed to or formed on arms 47 and 48, pivoted as aforesaid and disposed at opposite sides of the thread-bar. Their free ends engage with the oscillatory wall 43 as by means of pins 49 and 50 projecting through openings in the latter, and are connected by a spring 51, which holds the said pins against the portion 52 of the wall 43 between these openings. It will be perceived that the part 43 in effect comprises a member interposed between the dog and nut and operating in conjunction with the spring 51 to move and hold them in proper relation. As illustrated in Fig. 9 the width of the spacing portion 52 is such that in a midposition both the nut and dog are disengaged from the threads, so that the thread-bar and the record support may be slipped out, the disk 40 being removed for the purpose. The oscillatory cup 41 may be removably held in place by one or more screws 53 threaded into the fixed member or plate 44 and projecting through slots 54 in the cup wall 43, the heads of the screws overlying the outer faces of this wall.

The oscillatory member 41 is urged in one direction, preferably that required to engage the dog and to disengage the nut, by means of a spring 55 which may also be advantageously housed in the chamber within the end of the cup, where it connects one of the fixed screws 53 with a screw 56 on the cup. An automatic detent 57 serves to hold the said member against the action of this spring, with the nut in operative position and the dog removed from the return thread. When the detent is released, the spring 55 shifts the cup and reverses this condition, the extent of movement due to the spring being limited by a suitable stop, such as that afforded by opposing shoulders 58 on the

flange 42 and plate 8. Manual means is provided whereby the oscillatory member 41 is moved to engage the feed dog, while automatic means actuated by or connected with the record support causes movement of the member in the opposite direction to remove the nut and bring the return dog into action at the end of the record, that is to say, when the record drum has been fed to the point nearest the main supporting structure. One of these means acts directly upon the oscillatory member and the other upon the detent 57 to disengage the same.

With the spring 55 operative to move the oscillatory member to reversing position, as described, the starting device is connected to the member, and the drum-actuated means co-acts with the detent. In the particular construction shown, the starting device is desirably in the form of a push link 59 pivoted to the flange 42 of the cup to project through a suitable opening in the front of the doll, at the outer side of which it is provided with a head 60. The detent-tripping means may consist simply of a low projection 61 on the basal flange 62 of the record drum, the same being arranged so as to strike against the side of the detent 57 and thereby force the bent end 63 thereof away from the notch or shoulder 64 in the flange 42, with which it automatically engages when the link 59 is pushed inward.

Preferably, a spring-pressed reproducer 65, of the construction disclosed in Patent No. 1,097,771, dated May 26, 1914, to ourselves, is mounted slidably in a sleeve 66 mounted on a stationary reproducer bracket 67 projecting from the main supporting structure in the same general direction as the bearing axles of the record drum and spring motor, the bracket being conveniently secured at its inner end by screws 68 to the circular periphery of the gear case 10. The detent 57 heretofore described is preferably mounted on this bracket and actuates means for moving the reproducer in relation to the record. An exceedingly simple construction is secured by the provision of a single rock member, comprising a shaft 69 journaled in a lug 70 on the bracket 67 and bearing at one end the detent arm 57 and at the other end a fork 71 adapted to bear against pins 72 projecting from the neck 73 of the reproducer, so that the latter may be moved away from the record against the action of the compression spring 74, which tends to hold the reproducer point 75 against the record. A spring 76, encircling the shaft 69 and secured at opposite ends to the shaft and to a fixed part, serves to move the rock member in the direction which causes the detent 57 to drop into its notch 64 and to release the pressure of the fork 71 on the pins 72, with the result that the reproducer is brought into action. An in-

cline or cam surface 77 cut in the periphery of the flange 42 of the cup and terminating at the shoulder 64 enables the turning of the cup under the action of its spring 55 to complete the reverse movement of the rock member 57, 71 after the detent portion thereof has been shifted a certain distance by the tripping projection 61 on the record drum, and also eases the approach of the reproducer point toward the record when the cup is turned in the opposite direction by the starting device 60.

The axis of rotation of the rock member 57, 71, it will be observed, is parallel to the axis of the oscillatory member 41 and the parts co-axial therewith, and this fact, together with the mounting of the rock member on the reproducer bracket, makes it a simple matter to position the spring-pressed reproducer at substantially any point around the record that may be desired, this range of choice in the matter of locating the reproducer being made possible by the general co-axial construction of the apparatus, which avoids the presence of other structural or operative parts in locations where they would necessarily interfere with any particular position which might be selected for the reproducer and its support. In other words, the parts over or opposite to which the reproducer and reproducer bracket are disposed are included within the geometrical surface which would be generated by the revolution of the inner line of the reproducer and bracket about the main axis of the machine.

In the particular construction illustrated, the reproducer is located below the record support or, in reference to the doll, at the side of the record support remote from the head. The sound-conveyer or horn 78, which is properly supported and has telescopic connection at its free end with the sleeve 66, is shown provided adjacent this end with a return bend, from which the horn extends and flares upward behind the record support, and is finally directed forward over the same in an appropriately flaring mouth, so that the sound-conveyer is in effect curved about the record, thus making possible a horn of suitable length disposed in such manner as to occupy an extremely small amount of space.

Manifestly the form and arrangement of the horn, and the direction in which it is caused to extend, may be widely varied, according to the particular acoustic effect desired or the conditions imposed by the shape or size of the space, or container, or cabinet in which the apparatus is to be housed. The arrangement shown is more especially adapted for a space such as the interior of the doll body, which is comparatively high in reference to its other dimensions, but it will be understood that by suitable varia-

tions the apparatus is equally adaptable to horizontally-extending spaces or interiors of practically any form. In the case of a doll, the front wall of the body opposite the mouth of the sound-conveyer is provided with an opening 79 for the escape of the sound.

Dual winding means are provided for the spring motor. One means comprises a crank handle 80, which may be applied to the shaft of a winding pinion 81 disposed in a recess in the annular plate 4 and meshing with the winding gear 27. The other winding instrumentality comprises a spring tape device 82 operated by repeatedly pulling upon a tape 83, as more particularly shown in Figs. 14 and 15. This device comprises a rotatable drum 84 inside a stationary cover 85. The tape is secured at one end to this drum and is coiled between the periphery thereof and the peripheral wall of the cover. A spring 86 is coiled inside the drum and secured at opposite ends to the drum and to a head 87 fixed to an axle 88, the latter being screwed at one end into the plate 6 and at the other end receiving a nut 89 to hold the cover plate 85 in place. The drum 84 is fixed to a pinion 90 journaled on the axle and meshing with a gear 91 within a gear case 92. The said gear 91 is mounted to rotate about and relatively to the shaft 93 of the crank winder, and is adapted to have one-way driving connection therewith through the instrumentality of a pawl 94 on the gear and a cooperating ratchet 95 on the said shaft. Thus, when the tape 83 is pulled outward, the drum 84 is rotated, the spring 86 is tensioned, and the gear 91 is turned in such direction that its pawl has driven engagement with the ratchet. When the tape is released, the spring 86 winds the amount drawn out back into the casing 85 and turns the gear 91 in the reverse direction, but without affecting the winder shaft, because the pawl rides idly over the teeth of the ratchet.

In place of the ordinary ratchet mechanism for preventing backward rotation of the winding gear 27 of the driving spring, an improved construction is provided, which is equally effective and less liable to breakage, this being an important feature because the breaking of the holding dogs is a common cause of serious damage to talking machines. The improved construction comprises an arrangement of balls interposed between the winding gear and a stationary part and acting under the influence of springs, in conjunction with inclined surfaces on one or both of the parts to prevent retrograde movement of the gear. The preferred embodiment of this device is illustrated in Figs. 21, 22 and 23 wherein 96 represent recesses with inclined bottoms formed in the inner face of the wall 8 of the gear

case and 97 balls received partly in these recesses and partly in a continuous circular groove 98 inside of the winding gear. Fine helical springs 101 are disposed in the deeper parts of the recesses 96, so as to bear at one end against the end walls thereof and at the opposite end against the balls, these springs being of such length as to hold the balls yieldingly sufficiently far up on the inclines 100 so that they will contact simultaneously with these inclines and with the bottom or walls of the groove in the gear. The inclination of the bottoms of the recesses 96 is so arranged that during the rotation of the winding gear to wind the spring the relative movement between the gear and stationary wall tends to roll the balls toward the deeper portions of the recesses against the pressure of the springs 101, but as soon as the winding effort is relaxed these springs immediately urge the balls to positions where the tendency of the gear to turn backward wedges them against the incline, and thereby effectually blocks the gear. The side thrust which is thus imparted to the winding gear is transmitted to a flange or shoulder 102 projecting inward from the peripheral casing member 4 and separating the winding and driving gears from each other.

The governor 103 within the governor casing 11 is shown driven from the gear 33 through a pinion 104 meshing with this gear and compounded on a shaft 105 with a gear 106, the latter in turn meshing with a pinion 107 on the governor staff 108. The governor is illustrated more particularly in Figs. 16, 17, 18, where it is shown as comprising two opposite arms 109 pivoted at 110 in slots formed in opposite ends of a cross-piece 111 fixed to the staff 108. Opposed weights 112, each somewhat less than semi-circular, are slotted to receive the arms, to which they are pivotally connected by pins 113. Transverse spiral springs 114 connect the weights and arms in such manner as to oppose the outward movement thereof under centrifugal action; and a construction at once simple and effective is secured by inserting the ends of these springs in parallel openings in the weights at opposite sides of the arms and by causing the pins 113 to traverse these openings, so as to engage the convolutions of the springs and thereby secure the latter to the weights. The arms are provided with shoulders 115, which, upon the outward movement of the weights, act upon lateral extensions 116 of a sleeve 117 slidably mounted on the staff 108 and carrying at its other end a friction disk 118 to cooperate with an adjustment screw 119 having a suitable friction tip. When the weights and arms are moved toward each other, under the action of the springs 114, reversely arranged shoulders

120 engage with the opposite sides of the extensions 116, so as to move the friction disk away from the adjustable friction member.

5 Improved means are provided for holding the record on its support, the same comprising a friction clutch at the base of the drum operated solely by pushing the record into place. As illustrated more particularly in
10 Figs. 19 and 20, the preferred embodiment of this clutch comprises one or more spring bands 121 fixed to the drum at spaced points, as by drops of solder 122, and being of such length as to project intermediate these
15 points sufficiently to engage frictionally with the inner surface of the record when the latter is slipped into place. A flange 123 projects from the periphery of the drum a short distance in advance of the basal
20 flange 62, so as to afford a channel for the reception of the clutch bands, and the latter are preferably provided with rounded knobs 124 constituting their highest portions. The record itself is formed at its inner end with
25 an internal recess or rabbet 125 to accommodate the clutch. The inner surface of this recess upon encountering the knobs 124 forces the latter inward, with the result that the portions of the springs at the sides of the knobs are bowed outward, thereby af-
30 fording a considerable area of contact between the clutch member and the record. The flange 123, it will be understood, is sufficiently low to clear the inner surface of the recessed portion of the record. A
35 handle or handles 126, of appropriate form, are secured to the outer end of the record in such manner as to partially close the same, thereby preventing the possibility of insert-
40 ing the record wrong end first. In the particular construction illustrated these handles are in the form of upwardly flaring wings, formed integral with or secured to an annular shell 127, having an outer cylin-
45 drical flange 128 molded into the body of the record and flush with the inner surface thereof. These handles, it will be observed, leave the central part of the end of the record unobstructed, so that the axle 12 and its
50 brake disk 40 may project therethrough.

What we claim as new is:

1. In phonograph mechanism, the combination of a driving spring, a hollow cylindrical record support rotatable by and in
55 encircling relation to said spring, and means for feeding the record support over the spring.

2. In phonograph mechanism, the combination of a driving spring barrel and a ro-
60 tatable and axially movable record support in telescopic relation thereto.

3. In phonograph mechanism, the combination with a support and an axle project-
65 ing therefrom, of a record drum supported by said axle, a driving spring accommo-

dated within said record drum, and coaxial winding and driving gears connected with the spring interposed between the same and said support.

4. In phonograph mechanism, the combination with a support, and fixed axles projecting therefrom one within the other, of a
70 thread-bar mounted on the inner axle and carrying a record drum, and spring driving mechanism mounted on the outer axle. 75

5. In phonograph mechanism, the combination with fixed axles one within the other, of a thread-bar on the inner axle, a record drum carried by the thread-bar, a feed-nut
80 coöperative with the thread-bar, a rotary sleeve inside the outer axle having slidable driving connection with said thread-bar, and means mounted on the outer axle for driving said rotary sleeve. 85

6. In phonograph mechanism, a support
85 having an opening, inner and outer axles projecting therefrom and having basal portions clamping the support between them, in combination with a record support supported by the inner axle, and driving means
90 therefor supported on the outer axle. 95

7. In phonograph mechanism, a support having an opening, a hollow axle having a basal portion, an inner axle having a cap, said basal portion and cap clamping against
95 opposite sides of the support adjacent the opening and the one having a flange telescoping with the other to center the axles in relation to each other, and means for drawing said basal portion and cap to-
100 gether, in combination with a record support supported by the inner axle, and driving means therefor supported on the outer axle. 105

8. In phonograph mechanism, a support
105 having an opening, inner and outer axles projecting therefrom and having basal portions clamping the support between them, one of said basal portions having a centering flange fitting said opening and also fit-
110 ting into a recess in the other basal portion, in combination with a record support supported by the inner axle, and driving means therefor supported on the outer axle. 115

9. In phonograph mechanism, a support
115 having an opening, a hollow axle having a basal portion, and an inner axle having a cap, said basal portion and cap clamping against opposite sides of the support adjacent the opening and inclosing a chamber
120 between them, in combination with a record support supported by the inner axle, a hollow member between the axles for driving said record support, said member carrying a gear within said chamber, and means on
125 the outer axle for driving said gear. 130

10. In phonograph mechanism, spring driving means having a central opening, a thread-bar operative within said opening, a record drum secured to said thread-bar at
130

one side of the spring driving means, gearing at the opposite side thereof having splined connection with said thread-bar, and a feed-nut coöperative with the thread-bar.

11. In phonograph mechanism, spring driving means having a central opening, a telescoping driving connection extending through said opening, one member of which is a thread-bar splined to the other, and a record drum secured to said thread-bar.

12. In phonograph mechanism, an axle, spring driving means thereon, a co-axial thread-bar, a feed-nut carried by said axle, and a record drum secured to the thread-bar.

13. In phonograph mechanism, a hollow axle, spring driving means encircling the same, a thread-bar operative within said axle and driven by said means, a plate on the end of the axle, and a feed-nut having movable connection with said plate.

14. In phonograph mechanism, spring driving means, a cup encircling the same, a thread-bar passing through the end wall of the cup and within the spring driving means, by which it is driven, a record drum connected to the thread-bar, and a feed-nut housed between said cup and the spring driving means.

15. In phonograph mechanism, a hollow axle, a spring barrel encircling the same, a cup encircling the spring barrel, a member fixed on the axle between the end of the cup and the spring barrel, a feed-nut having connection with said member, and a thread-bar telescoping within said axle in coöperative relation to the feed-nut.

16. In phonograph mechanism, spring driving means, a record drum rotatable around said driving means, a central thread-bar connected to the record drum, an oscillatory cup disposed co-axially between said spring driving means and record drum, a fixed member, and a feed-nut having connection both with the cup and said fixed member and movable by the former relatively to the thread-bar.

17. In phonograph mechanism, spring driving means, an oscillatory member encircling said spring driving means, a record drum rotatable and movable axially over said spring driving means and member, a thread-bar connected to said record drum, and a feed-nut coöperative with said thread-bar and movable relatively thereto by said oscillatory member.

18. In phonograph mechanism, spring driving means having a central opening, an oscillatory member encircling said spring driving means, a record drum rotatable and movable axially over said spring driving means and member, a thread-bar connected to said record drum and operative in the central opening in said spring driving means, gearing connecting said means with the thread-bar and having slidable connec-

tion with the latter, a fixed member, and a feed-nut having connection with said oscillatory member and fixed member and movable by the former relatively to the feed-bar.

19. In phonograph mechanism, spring driving means, a record drum co-axial therewith, a thread-bar connected to the record drum, a feed-nut coöperative with the thread-bar, an oscillatory member encircling the spring driving means to control said feed-nut, a spring tending to turn said member in one direction, a detent for holding said member against the action of said spring, a starting device whereby the member may be caused to turn in one direction, and means connected with the record drum whereby the member is caused to turn in the opposite direction.

20. In phonograph mechanism, a support, bearing means projecting therefrom, spring driving means and a co-axial thread-bar supported by said bearing means, a feed-nut coöperative with the thread-bar, and an oscillatory member encircling said spring driving means and journaled at one end on said support and at the other end having means for actuating said feed-nut.

21. In phonograph mechanism, a support, bearing means projecting therefrom, spring driving means and a co-axial thread-bar supported by said bearing means, a feed-nut coöperative with the thread-bar, and an oscillatory member encircling said spring driving means and having at one end a flange rim-journaled in said support and at the other end means for moving said feed-nut.

22. In phonograph mechanism, spring driving means, a co-axial thread-bar, an oscillatory cup encircling said spring driving means, a fixed member within said cup, a feed-nut pivotally mounted on one of the two last-mentioned elements and adapted to be engaged by the other, a spring connecting said elements and tending to turn the cup, and a detent operative to hold the cup against the action of the spring.

23. In phonograph mechanism, spring driving means, a co-axial thread-bar, a record drum connected thereto, an oscillatory cup encircling said spring driving means, a fixed plate opposed to the end wall of said cup, a feed-nut between and having connection with said plate and wall, and a spring between and connecting said plate and wall for turning the cup.

24. In phonograph mechanism, spring driving means, a record drum co-axial therewith, a thread-bar connected to the record drum, a feed-nut coöperative with the thread-bar, an oscillatory member encircling the spring driving means to control said feed-nut, a spring tending to turn said member in one direction, a detent for holding said member against the action of said spring, a starting device connected with said

member to turn the same in one direction, and means connected with the record drum for tripping said detent.

25. In phonograph mechanism, the combination of a record drum, a reproducer movable toward and from said drum, a thread-bar connected with the drum, a feed-nut cooperative with the thread-bar to produce relative longitudinal movement between the drum and reproducer, a member movement of which in opposite directions causes engagement and disengagement, respectively, of the feed-nut with the thread-bar, a spring tending to move said member in one direction, a starting device for moving said member in the opposite direction, a detent for holding said member against the action of the spring, means on the record drum for tripping said detent, and a connection between said detent and the reproducer.

26. In phonograph mechanism, a record drum, a reproducer, a thread-bar and a feed-nut for producing relative longitudinal movement between the record drum and reproducer, of an oscillatory member encircling the thread-bar for controlling said feed-nut, and a rock-shaft journaled in a bearing parallel with the feed-bar and having an arm at one end constituting a detent for engagement with the oscillatory member and at the other end a fork to engage the reproducer.

27. In phonograph mechanism, spring driving means, a thread-bar driven thereby, a feed-nut cooperative with said thread-bar to move the same longitudinally, a record drum secured to the thread-bar in encircling relation to the spring driving means, an oscillatory member encircling the spring driving means within the record drum to control said feed-nut, a spring urging said oscillatory member in one direction, starting means for moving it in the other direction, a rock member mounted to turn on an axis parallel to the oscillatory member and constituting a detent adapted to engage automatically therewith, a reproducer also controlled by said rock member, and means on the record drum for tripping said rock member.

28. In phonograph mechanism, the combination of a record drum, a reproducer, a thread-bar having a feed thread and a reverse thread, a feed-nut engageable with the feed thread, a dog engageable with the reverse thread, and an oscillatory member en-

circling the thread-bar for alternately engaging the feed-nut and dog with the respective threads.

29. In phonograph mechanism, the combination of a record drum, a reproducer, a thread-bar having a feed thread and a reverse thread, a feed-nut engageable with the feed thread, a dog engageable with the reverse thread, a member encircling the thread-bar and on which said nut and dog are pivoted, a second member encircling the thread-bar and having portions engaging said nut and dog, a spring connecting said nut and dog and holding them against said portion, and means for producing relative oscillation between said members.

30. In phonograph mechanism, an axle, a thread-bar thereon having a feed thread and a reverse thread deeper and steeper than the feed thread, the thread-bar also being formed with an external spline, a rotary driving member encircling the thread-bar and having a feather engaging said spline, a record drum carried by the thread-bar, a feed-nut engageable with the reverse thread to return the record support to normal position, and a brake member on the end of the axle adapted to arrest the rotation of the thread-bar and drum.

31. The combination of a rotatable axially fed record drum, a thread-bar connected thereto, a feed-nut, an oscillatory member co-axial with the thread-bar for controlling said feed-nut, a reproducer, and a member rockable about an axis parallel to the axis of the feed-bar and connecting the reproducer with said oscillatory member.

32. In phonograph mechanism, the combination of a support, a record drum supported thereby for rotation and axial movement, a thread-bar connected to said drum, a feed-nut, an oscillatory member co-axial with the thread-bar for controlling said feed-nut, a reproducer bracket secured to the support, a reproducer on said bracket, and a member mounted on said bracket for connecting the reproducer with said oscillatory member.

In witness whereof, we have hereunto set our hands this 29th day of June, 1914.

WILLIAM ROTTER.
RICHARD S. ARTHUR.

In the presence of—

ROBERT C. BIRKHAHN,
CLARENCE G. GALSTON.

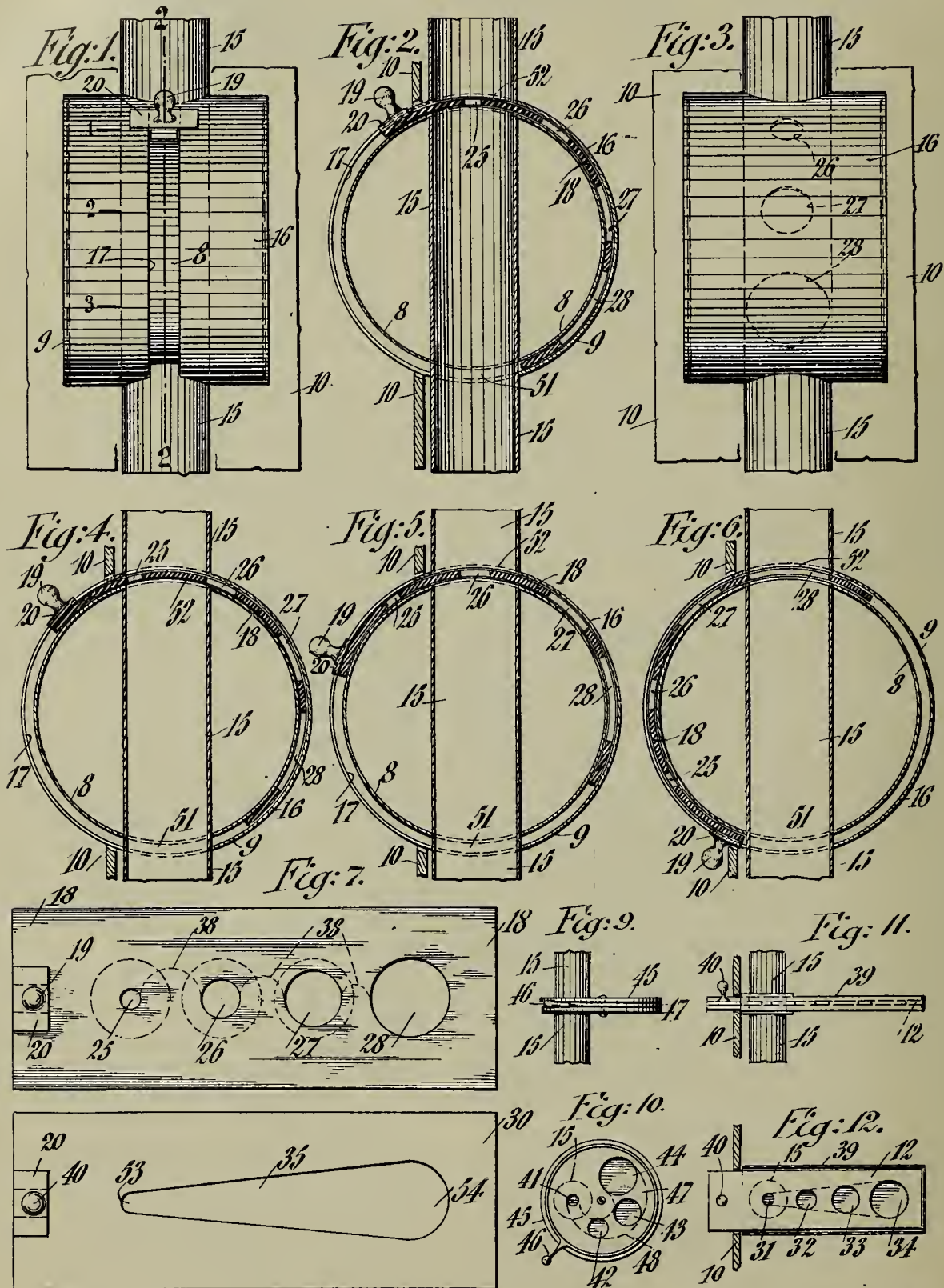
TONE MODERATOR FOR TALKING
MACHINES,

1,167,972-----G. E. Brightson,
Patented-Jan. 11, 1916.
Filed-February 17, 1914.

G. E. BRIGHTSON.
TONE MODERATOR FOR TALKING MACHINES.
APPLICATION FILED FEB. 17, 1914.

1,167,972.

Patented Jan. 11, 1916.



Witnesses:
F. Nogg.
G. Loch.

Fig. 8.

Inventor
George C. Brightson
By his Attorney
Carl P. Gense.

UNITED STATES PATENT OFFICE.

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TONE-MODERATOR FOR TALKING-MACHINES.

1,167,972.

Specification of Letters Patent.

Patented Jan. 11, 1916.

Application filed February 17, 1914. Serial No. 819,275.

To all whom it may concern:

Be it known that I, GEORGE E. BRIGHTSON, a citizen of the United States of America, and resident of Oyster Bay, in the county of Queens and State of New York, have invented certain new and useful Improvements in Tone-Moderators for Talking-Machines, of which the following is a specification.

This invention relates to tone-moderators for talking-machines, and has for its object to provide an improved device which may be conveniently operated, and which serves to eliminate the objectionable feature of phonographs known as "scratch". The device is so arranged that the passage of the sound is not impeded so as to disadvantageously influence the tone produced by the instrument. The invention carries out these objects and will be more fully described hereinafter and finally pointed out in the claims.

In the accompanying drawing, Figure 1 is a front-view of the part of the leader through which the sound passes, with the improved tone-moderator applied thereto, arranged within the phonograph-case and operated from the outside thereof, Fig. 2 is a vertical section taken on line 2—2 of Fig. 1, Fig. 3 is a view of the opposite side of the device from that shown in Fig. 1, Fig. 4 is a section taken on line 2—2 of Fig. 1, but with the valve in a different position from that shown in Fig. 2, Fig. 5 is a similar section with the valve in another position, Fig. 6 is a similar section with the valve in still another position, Fig. 7 is a plan view of the valve, removed from its casing, Fig. 8 is a plan of a modified form of valve, Figs. 9 and 10 are respectively a front-view and a plan-view, both on a smaller scale than the preceding figures, of another form of valve, in its housing, and Figs. 11 and 12 are respectively a front-view and a plan-view of another form of the invention.

Similar reference characters indicate corresponding parts throughout all the figures of the drawing.

Referring to the drawing, and more particularly to Figs. 1 to 6, the leader 15 shown in the drawing corresponds to that portion of the sound-passage which is between the horn and the sound-producing means. Suitably secured to the sound-passage 15 is

a circular housing 16, which has in its circumference a slot 17 for the handle 19, which is used to manipulate the valve of the device. The housing is arranged in the phonograph-case 10, and the handle 19 protrudes therefrom, so as to be readily operated at the outside of the phonograph-case 10.

In the embodiment shown in Figs. 1 and 2, the valve is indicated by 18 and is bent arcuate, to correspond to the circular shape of the housing 16. For the purpose of accommodating the valve 18, the housing consists of two concentric walls 8 and 9, between which the valve 18 is guided. These concentric walls have openings 51, 52, at the connections of the leader, so that the leader has an entirely open passage at 51 corresponding to its cross-section, and has another completely free and open passage at 52 corresponding to its cross-section at that point. The valve 18 is provided with a plurality of circular openings, indicated by 25, 26, 27 and 28, the opening 28 being the largest of the series and having an area equal to the cross-section of the leader 15, so that when the opening 28 is in registration with the leader 15, then the tone can pass out from the lower portion of the leader to the upper portion thereof unimpeded and uninfluenced by any obstruction. This condition corresponds to that where the loudest tone is desired, and would correspond also to that condition of the leader when no moderator or modulator is used. The opening 27 has an area smaller than the opening 28, and when this opening is placed in registration with the leader 15 a less amount of volume of sound is permitted to pass, so that the tone is modulated and of less force than that which would pass through when the opening 28 is in registration. Similarly, the opening 26 is smaller than the opening 27, and the opening 25 is the smallest of all. Thus, in Fig. 2, the smallest opening 25 is shown in the sound-passage, and hence a diminished tone-volume is permitted to pass through. It will be noted that this opening 25 is in substantially axial position to the leader or tube 15, and this is important, as thereby the sound may flow freely through the opening 25 without being injuriously affected. The valve is made of felt, and thereby takes up scratch. The different openings correspond to different volumes of

sound. In order to indicate which opening is in registration with the sound-passage, the casing 16 is provided at its exterior with indicator-markings, 1, 2, 3 and 4, as shown in Fig. 1, so that the slide 20 carrying the handle, may be readily brought into alignment with these indications, and thereby definite steps in the gradation of the tone established.

In Fig. 4 is shown the valve with the opening 25 about to be closed, and the opening 26 about to be opened, that is, about to be brought in the path of the sound. It will be noticed that as the opening 25 gradually decreases in size, the opening 26 gradually increases, so that at all times during the opening and closing of the openings 25 and 26, or any other two openings, there is open space gradually varying in amount, in either increasing or decreasing proportion, in the line of the sound-passage, so that the variation from one volume to another will not be marked, but will be gradually reached, and not in any manner abruptly attained.

The valve 18 with the openings therein is composed of a block of felt, and this is a very important consideration, as it is found that felt softly and snugly fits and closes the grooves of the guideway in which it slides against the passage of sound through said grooves around the edges of the valve, and has a very pleasing effect on the tone when it is used to modulate the same. It is found, for instance, that where old records are used, or where the needle is not as efficient as it was in the beginning of its use and thereby certain more or less unmusical notes or "scratching" are produced, the felt absorbs to a large extent these objectionable noises and causes the tone which is produced to be smooth and agreeable.

In Figs. 11 and 12 is shown a flat valve 12 composed of a block of felt, having openings 31, 32, 33 and 34, and in which the distance between the openings successively decreases as the size of the openings increases, so that when advancing the valve the total open area increases gradually, and when closing decreases gradually, so that no abrupt changes in the tone take place when one opening is moved away and its place taken by another opening. The valve is guided in a flat housing 39 and operated by a handle 40 at one end of the valve.

In Fig. 8 the valve 30 is composed of a block of felt, and has a single opening 35, one end-portion 53 of which has an opening substantially the same width as the diameter of opening 31 shown in Fig. 7, while the other end-portion 54 is of substantially the same width as the diameter of the opening 34 of Fig. 7. That part of the opening 35 between the ends 53 and 54 is graduated in width from the end 53 to the end 54, so that when the valve is moved the sound is

gradually increased in force or gradually decreased, according to the direction of movement.

In Figs. 9 and 10, the openings 41, 42, 43, 44, are arranged in a circle and cut out of a flat disk-shaped block 47 of felt. A housing 45 is provided through which the handle 46 protrudes. By operation of the handle, one opening after another is brought into registration with the sound-passage 15 indicated in dotted lines 15 in Fig. 10.

In place of the successive openings, a single elongated curved opening of gradually increasing breadth, may be employed, as indicated in dotted lines 48 in Fig. 10.

The modulation of the tone and exclusion of irregular sounds is caused by reason of the felt snugly fitting and closing the grooves of its guideway and by reason of the fact that the change in area of opening, when shifting the valve, is always gradual, and by reason of this characteristic feature of the invention, the tone may be modulated without abrupt changes therein.

The tone-moderator is readily manipulated from the exterior of the sound-passage, and in practice it is customary to arrange the handle at the exterior of the wall 10 of the phonograph-case. By this means the moderator may be manipulated from the exterior of the phonograph, so that the moderator may be operated and used without opening the top or cover of the case or affecting in any manner the operation of the parts.

Several embodiments of the invention have been described, but changes may be made therein without departing from the spirit of the invention as defined in the appended claims.

I claim:—

1. A combination of an intermediate sound conduit of a talking machine provided between the end thereof which connects with the sound box and the end thereof which connects with the horn with a transverse slot cut through the wall of said conduit throughout the circumference thereof, a valve casing extending laterally from said conduit and provided with a guideway broader than said conduit and registering with the slot thereof, and a block of felt constituting a valve and slidable in said guideway and softly and snugly fitting and closing the grooves thereof against the passage of sound through said grooves around the valve, and operative to cover or vary the sound passage of said conduit.

2. A combination of an intermediate sound conduit of a talking machine provided between the end thereof which connects with the sound box and the end thereof which connects with the horn with a transverse slot cut through the wall of said conduit throughout the circumference thereof, a valve casing ex-

tending laterally from said conduit and provided with a guideway broader than said conduit and registering with the slot thereof, and a block of felt constituting a valve 5 and slidable in said guideway and softly and snugly fitting and closing the grooves thereof against the passage of sound through said grooves around the valve, and provided with a series of openings of different 10 areas adapted to vary the sound passage of said conduit.

3. A combination of an intermediate sound conduit of a talking machine provided between the end thereof which connects with 15 the sound box and the end thereof which connects with the horn with an arc-shaped transverse slot cut through the wall of said conduit throughout the circumference thereof, a valve casing in the form of a ring hav-

ing a circumferential slot, extending later- 20 ally from said conduit and provided with an arc-shaped guideway broader than said conduit and registering with the slot thereof, and a valve of soft material slidable snugly 25 in said guideway and adapted to cover the cross-section of said conduit at said arc-shaped slot, and provided with an opening of smaller area than said conduit adapted to change the sound passage thereof and 30 with a knob projecting through said circumferential slot.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

GEORGE E. BRIGHTSON.

Witnesses:

G. LOWE,
F. HOGG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

... ..

VEHICLE SIGNALING SYSTEM,
1,168,053-----G. E. Boyden,
Patented-Jan. 11, 1916.
Filed-July 17, 1914.

1,168,053.

G. E. BOYDEN.
VEHICLE SIGNALING SYSTEM.
APPLICATION FILED JULY 17, 1914.

Patented Jan. 11, 1916.
6 SHEETS—SHEET 1.

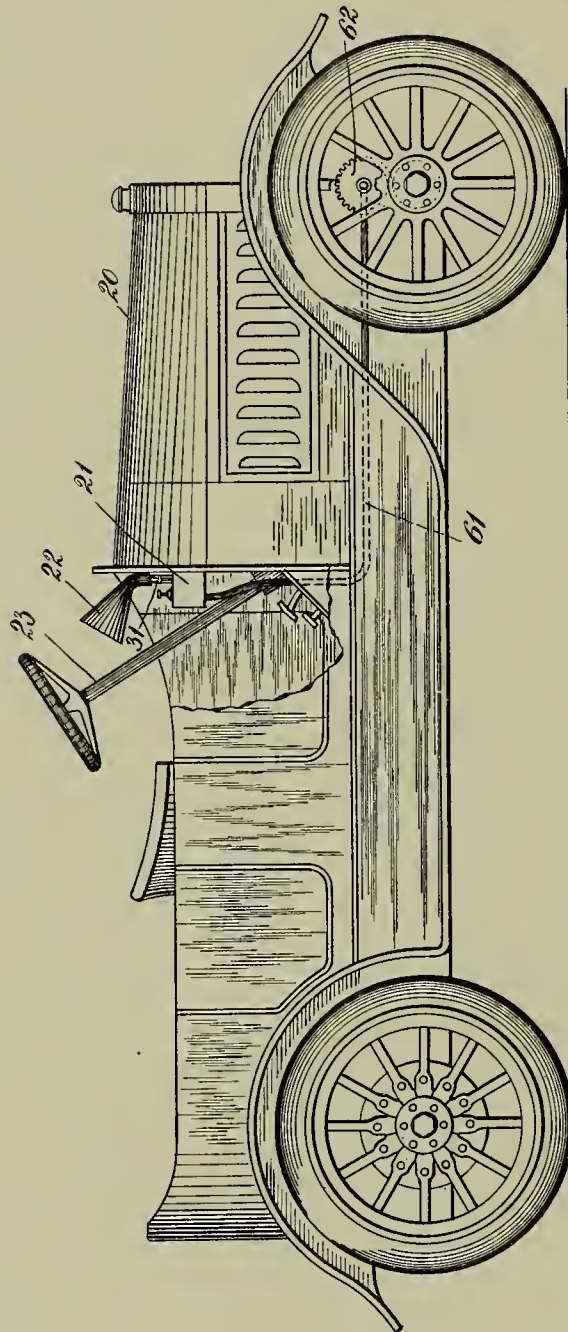


Fig. 1.

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 VEHICLE SIGNALING SYSTEM.
 APPLICATION FILED JULY 17, 1914.

1,168,053.

Patented Jan. 11, 1916.

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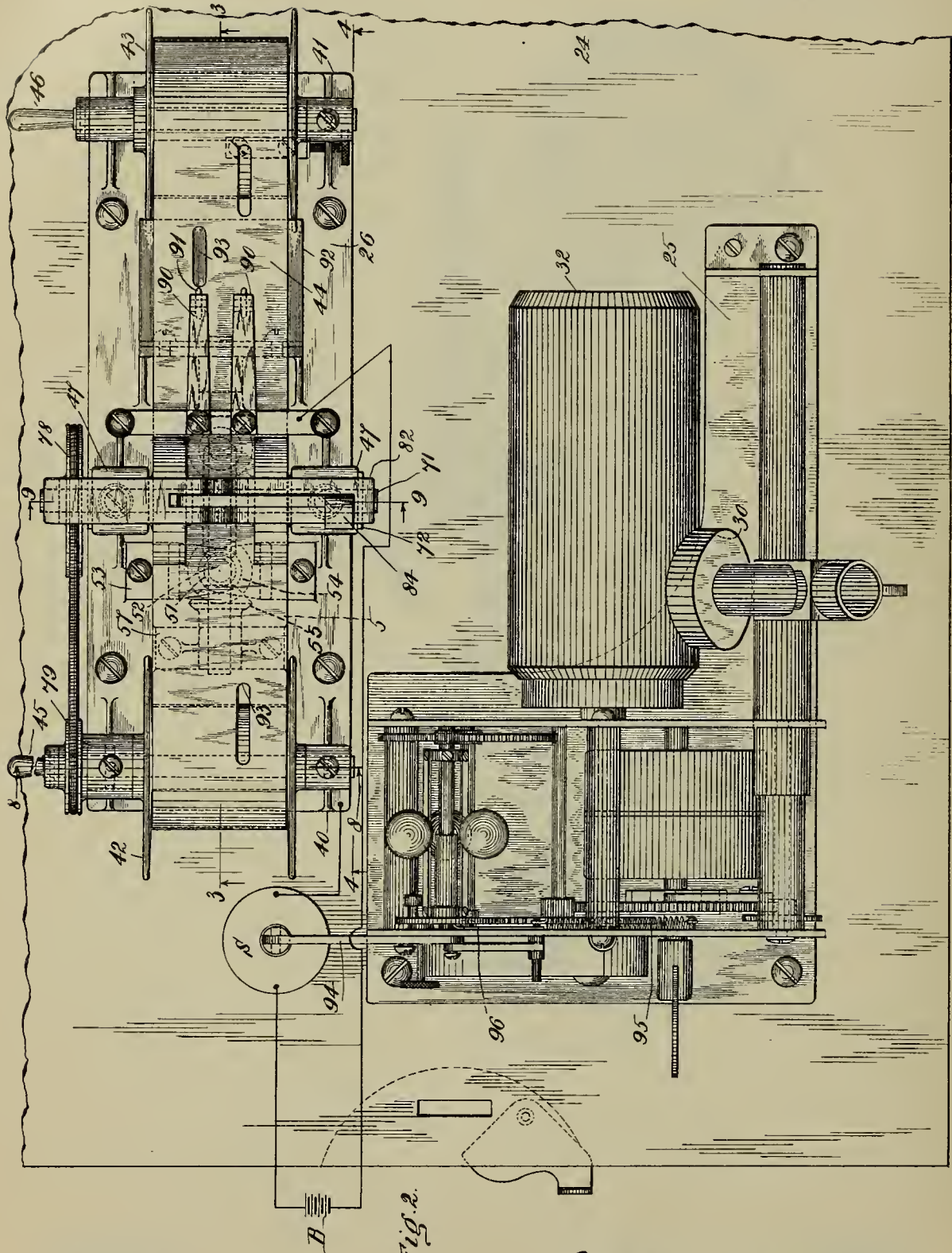


Fig. 2.

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VEHICLE SIGNALING SYSTEM.
APPLICATION FILED JULY 17, 1914.

1,168,053.

Patented Jan. 11, 1916.
6 SHEETS—SHEET 3.

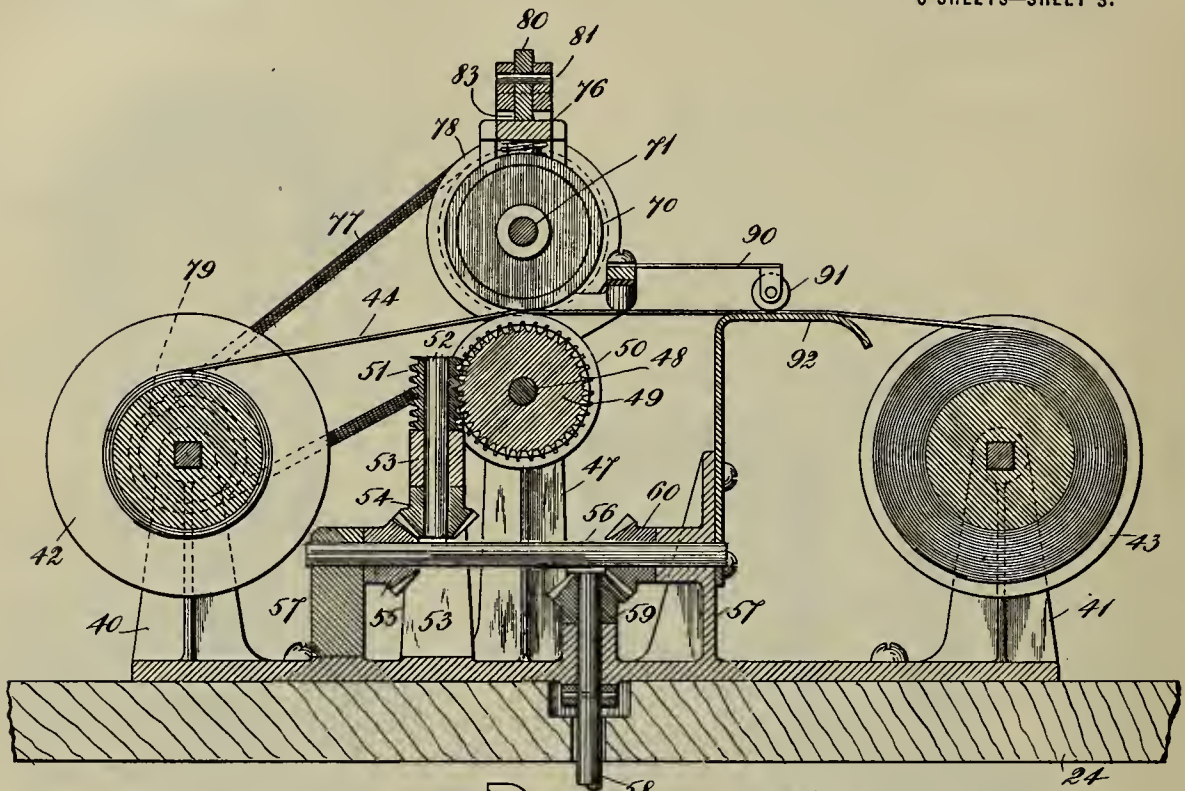


Fig. 3.

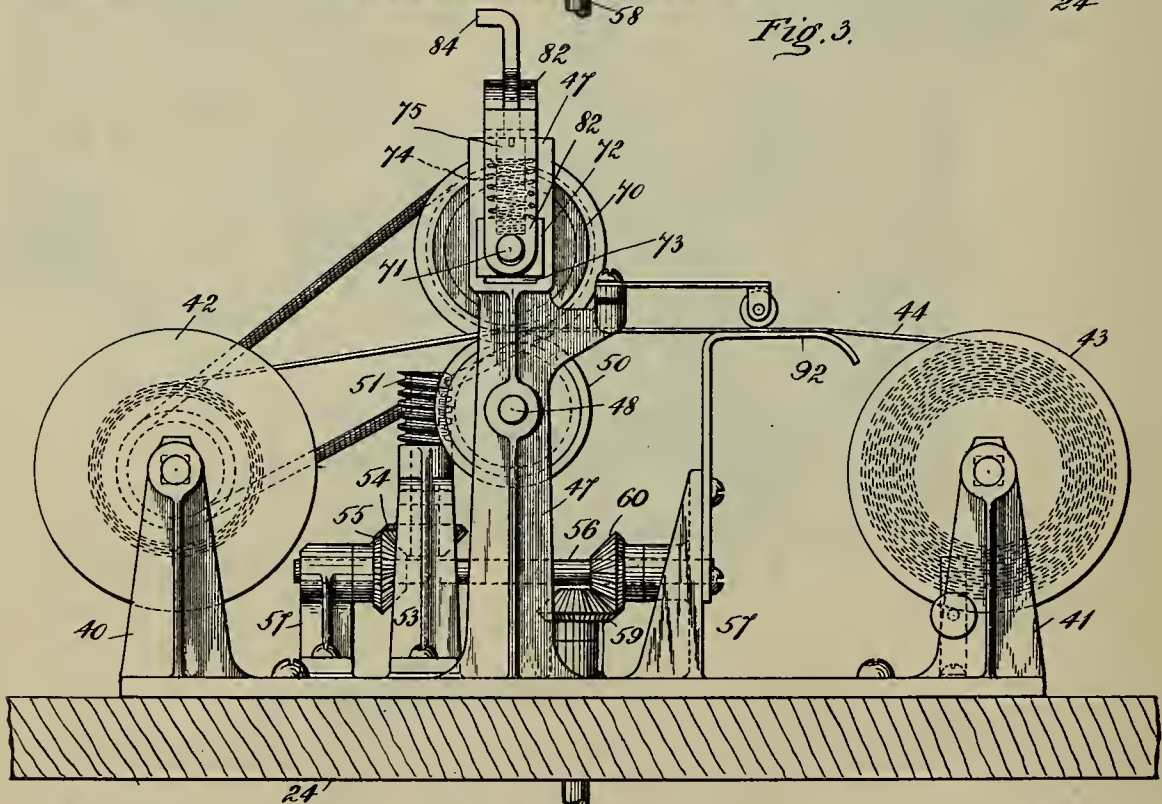


Fig. 4.

WITNESSES
Patrick J. Conroy.
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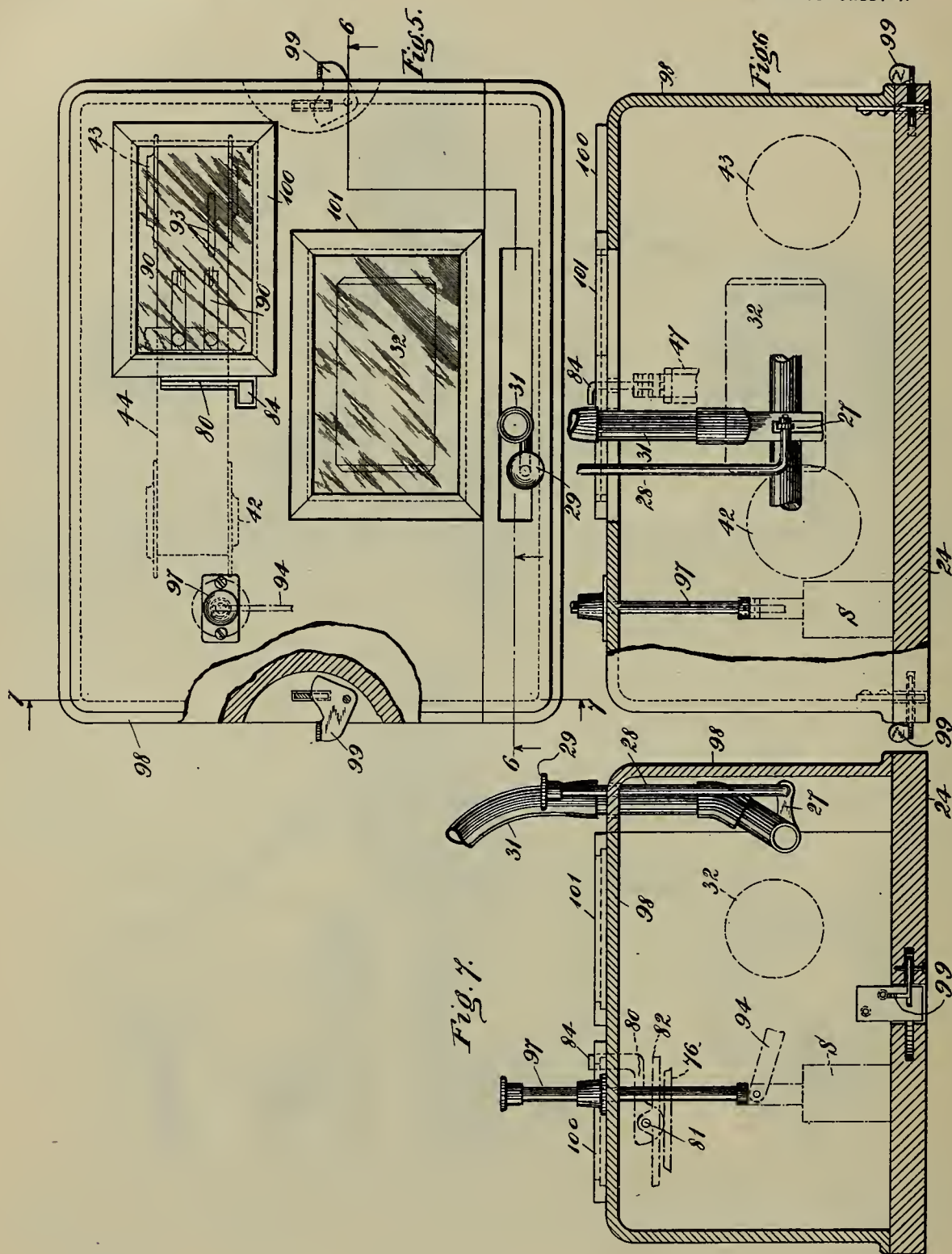
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VEHICLE SIGNALING SYSTEM.
APPLICATION FILED JULY 17, 1914.

1,168,053.

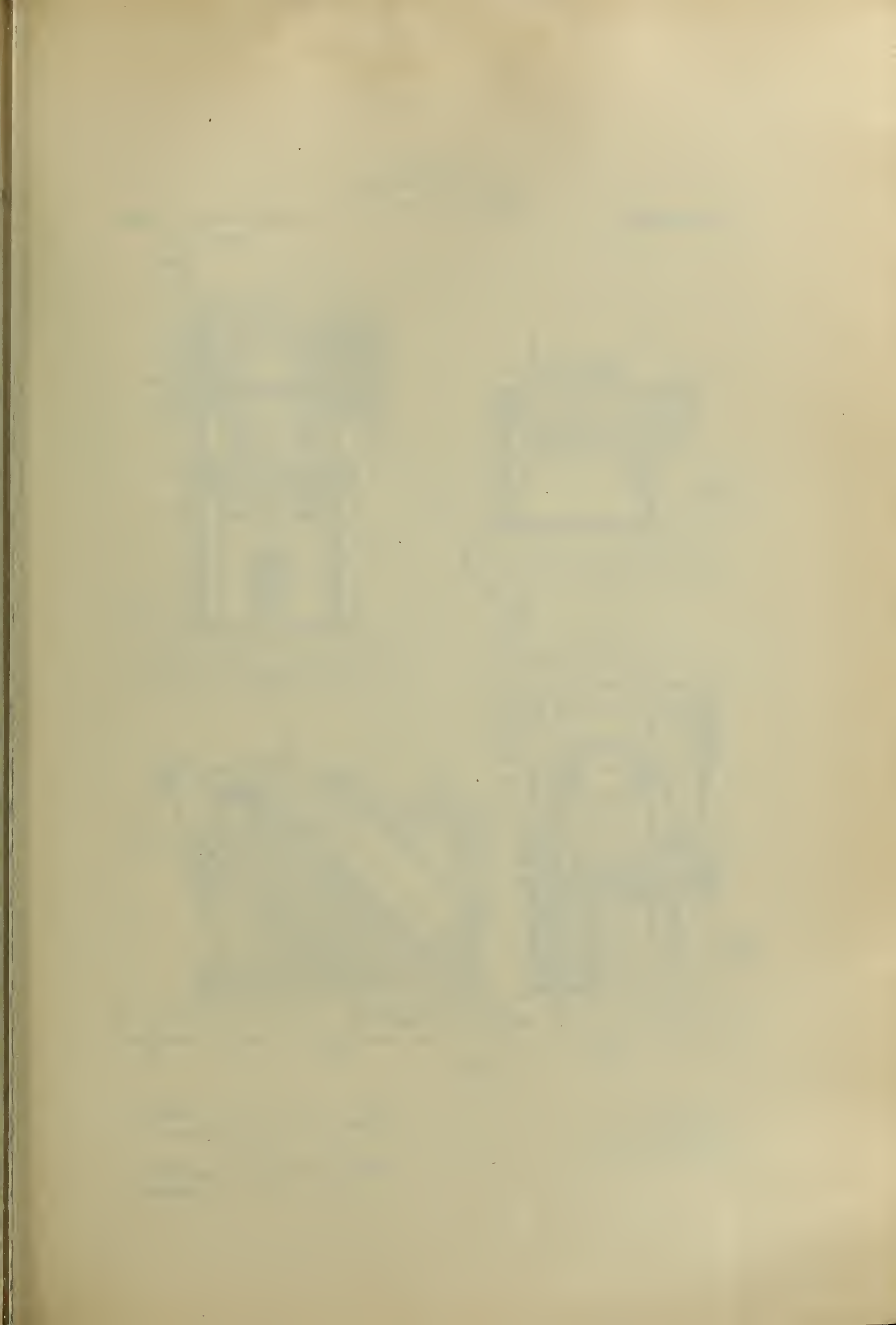
Patented Jan. 11, 1916.

6 SHEETS—SHEET 4.



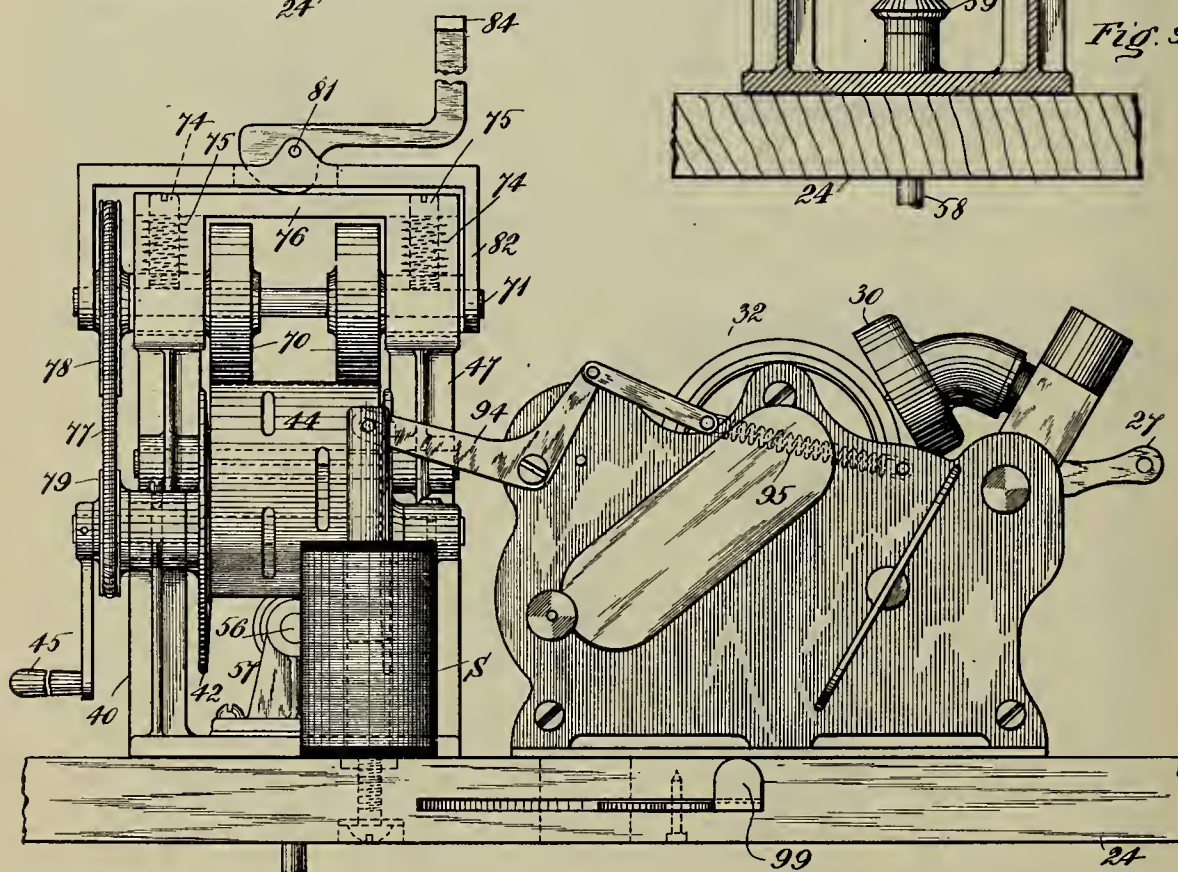
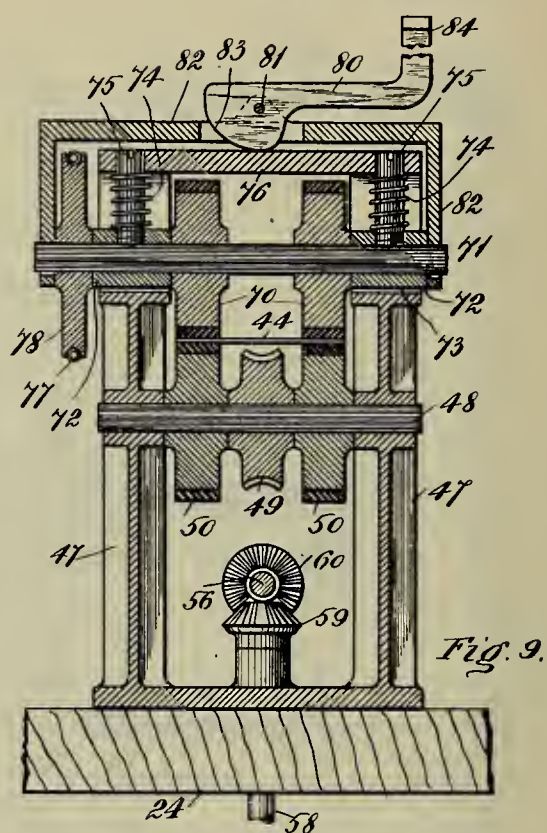
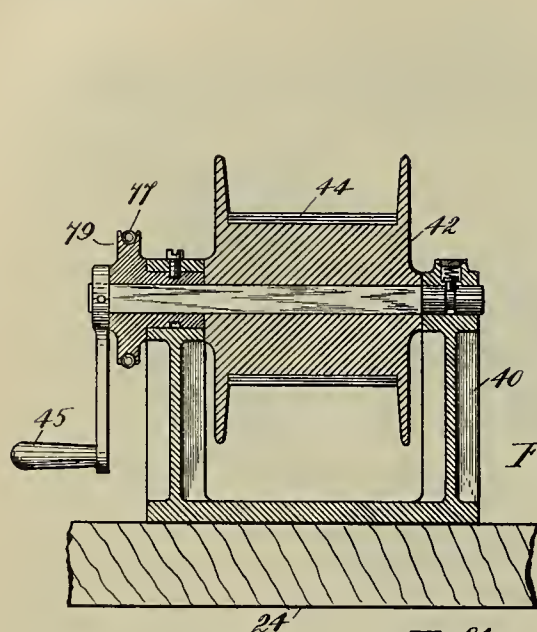
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1,168,053.

6 SHEETS—SHEET 5.



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VEHICLE SIGNALING SYSTEM.
APPLICATION FILED JULY 17, 1914.

Patented Jan. 11, 1916.

6 SHEETS—SHEET 6.

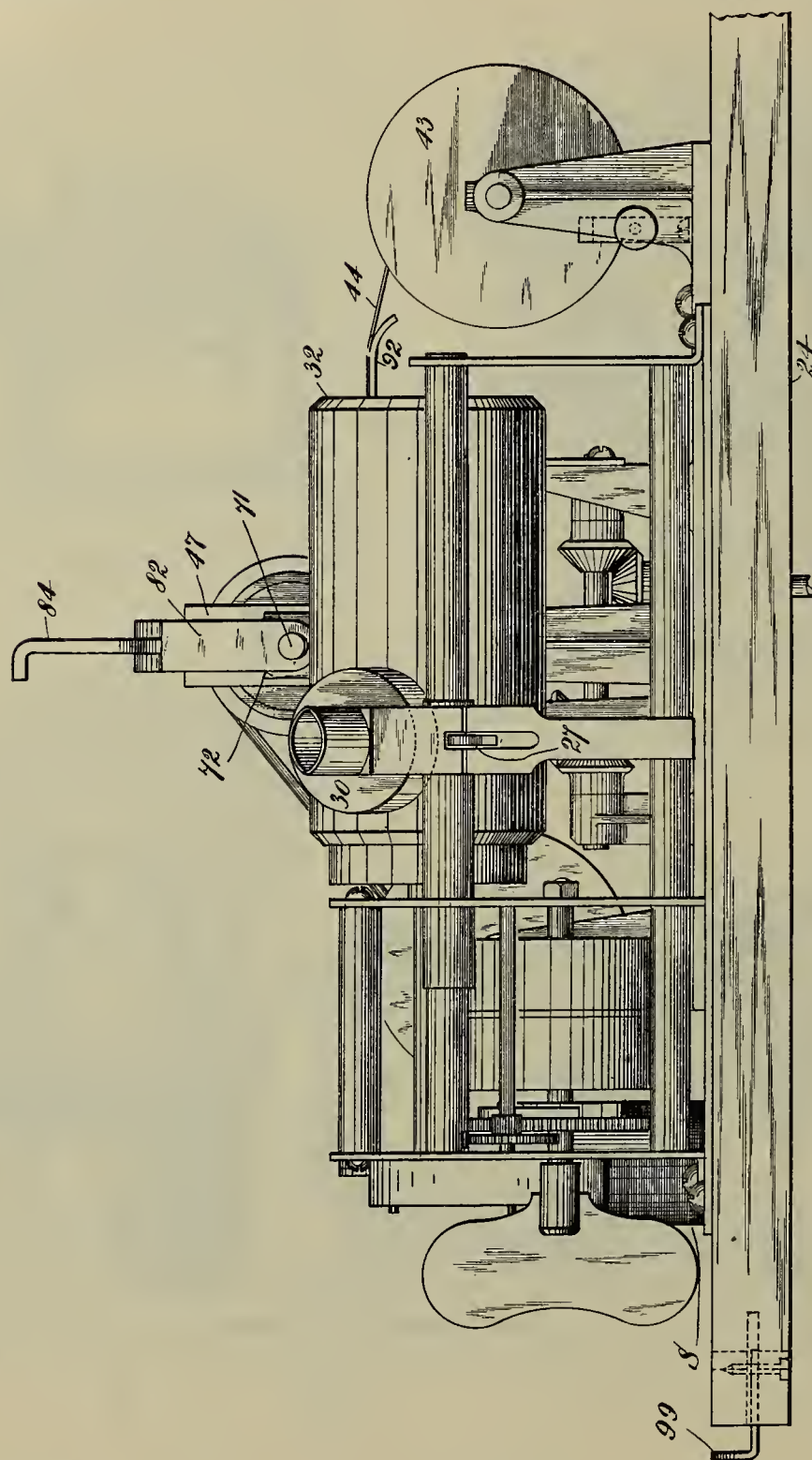


Fig. 11.

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UNITED STATES PATENT OFFICE.

GEORGE E. BOYDEN, OF NEW YORK, N. Y., ASSIGNOR TO ALEXANDER P. BROWNE,
TRUSTEE, OF BOSTON, MASSACHUSETTS.

VEHICLE SIGNALING SYSTEM.

1,168,053.

Specification of Letters Patent.

Patented Jan. 11, 1916.

Application filed July 17, 1914. Serial No. 851,451.

To all whom it may concern:

Be it known that I, GEORGE E. BOYDEN, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented a new and useful Improvement in Vehicle Signaling Systems, of which the following is a specification.

My invention relates to signaling apparatus for vehicles, and its object is to provide means for announcing to the driver of a vehicle such as an automobile, the directions for following a predetermined route.

An illustrative embodiment of my invention is shown in the accompanying drawings in which—

Figure 1 is a side elevation of an automobile provided with my improved apparatus. Fig. 2 is a plan view of my improvement with the casing removed. Fig. 3 is a central longitudinal section taken on the line 3—3 of Fig. 2. Fig. 4 is a side elevation, partly in section, of the phonograph-control apparatus, the section being taken on the line 4—4 of Fig. 2. Fig. 5 is a plan view of my improvement with the casing in position, certain parts being broken away to show the lock for securing the casing to its base. Fig. 6 is a section taken on the irregular line 6—6 of Fig. 5, certain parts being shown in elevation and certain other parts being omitted for the sake of clearness. Fig. 7 is a transverse section taken on the line 7—7 of Fig. 5. Fig. 8 is a transverse section of one of the web-reels taken on the line 8—8 of Fig. 2. Fig. 9 is a transverse section taken on the line 9—9 of Fig. 2. Fig. 10 is an end elevation of the apparatus shown in Fig. 2 with the casing removed. Fig. 11 is a side elevation of said apparatus.

In the particular drawings selected for more fully disclosing my invention, 20 represents an automobile having my signaling apparatus 21 secured thereto in the position in which I prefer to place it, namely, on the dash-board in proximity to the steering post 23, so that the megaphone 22 will be directly in front of the driver, although it will be understood of course that both the signaling apparatus and its megaphone may be located in any other suitable position,

the megaphone, for example, being placed beside instead of in front of the driver.

Suitably mounted on a base 24 are a phonograph 25 of any suitable type and a device 26 for controlling the same, so that the talking machine at the proper times will announce the directions whereby the driver will be enabled to follow a predetermined route. Inasmuch as the mechanism of the particular talking machine shown in the drawings is well understood, I deem it unnecessary to describe the same further than to say that by means of the rod 28, provided with a push-button 29 and coupled to the link 27, the transmitter 30 may be swung back from the record cylinder 32 and moved manually along its operating shaft to any desired position. The megaphone 22 above referred to is attached to the transmitter by means of the flexible tube 31, and when the megaphone is placed beside the driver this tube may be conveniently disposed along the side of the motor car.

In the particular control apparatus shown in the drawings, reels 42, 43 are mounted on standards 40, 41, said reels being provided with handles 45, 46, whereby the web 44 may be adjusted in position as hereinafter more fully described. Located approximately midway between the reels is a pair of standards 47 in which is journaled the horizontal transverse shaft 48, which carries the worm gear 49 and the rubber-covered rollers 50. Meshing with said worm gear is a worm 51 carried by the vertical shaft 52 mounted in the standard 53 and carrying at its lower end the bevel gear 54 meshing with the bevel gear 55 carried by the longitudinal horizontal shaft 56 which is mounted in the standards 57, 57. The shaft 56 is rotated by the vertical shaft 58 and the bevel gears 59, 60 secured to the shafts 58 and 56 respectively, the lower end of the shaft 58 extending through the base 24 and being connected to the flexible shaft 61, which is rotated in the well known manner by means of a system of gearing associated with the spur gear 62 meshing with a gear connected to the car wheel, so that a definite relation exists between the speed of the car and the rotational speed of said flexible shaft. As will be obvious, the

flexible shaft 61 may be the usual speedometer shaft and may pass through the speedometer and be coupled to the vertical shaft 58.

5 Coöperating with the rollers 50 is a pair of rollers 70, also preferably rubber-covered, which are rigidly secured to the shaft 71 mounted in the journal blocks 72 arranged for vertical movement in the boxes 73 with
10 which the upper ends of the standards 47 are provided.

Springs 74 surrounding the studs 75, which pass through the cross-bar 76 and are threaded into the journal blocks 72, normally
15 press the rollers 70 into contact with the lower rollers, so that by the actuation of the latter the web 44 will be drawn off the reel 43 at a rate proportional to the speed of the vehicle. The web is wound on the
20 reel 42 actuated by the slip-belt 77 of the usual construction, which passes around the pulleys 78, 79, secured to said shaft 71 and reel 42, respectively.

In order to release the pressure exerted
25 on the web by the rollers for the purpose of manually adjusting the web with respect to the contact-makers 90, the upper rollers may be raised against the tension of the springs 74 by means of the lever 80 which is pivoted
30 at 81 to the yoke 82, the ends of which overhang the top of the standards 47 and inclose the ends of the shaft 71, the cam surface 83 of said lever coöperating with the cross-bar 76 in a manner that will be obvious.
35 Preferably the upper end 84 of the lever projects through an aperture in the casing which incloses the apparatus.

One or more contact-makers 90, herein shown as two in number, preferably provided at their outer ends with metallic
40 wheels 91 are secured to and insulated from the standard 47 and are arranged to coöperate with the platen 92 over which the web passes. The battery B is serially connected
45 with the solenoid S and one terminal of the latter is grounded on the metallic framework so that it is in electrical connection with said platen, and the other terminal is connected to the metallic cross-bar which carries the
50 contact-makers. The web is provided with one or more series of perforations 93, arranged in line with the contact-makers, so that whenever one of the latter passes through a perforation it will close the circuit of the battery and energize the solenoid
55 thereby actuating the bell-crank 94 normally retracted by the spring 95 and so releasing the phonograph brake 96. For manual operation of the brake-releasing device, the
60 push-rod 97, the lower end of which is connected with the solenoid plunger and the upper end of which projects above the casing, may be employed. Preferably the casing 98, which is secured to the base in any
65 suitable manner, for example by the locking

devices 99, is provided with windows 100, 101, arranged respectively over the contact-makers and record cylinder.

The web may be perforated by reference to a road-book, an appropriate length corresponding to a known distance being reeled
70 off manually, a perforation, preferably elongated as shown, being made and then certain directions spoken into the receiver of the phonograph. For example, if it is desired to make a record to guide the driver
75 from Chevy Chase to the Treasury Department, the record among other things would contain the directions "U street turn to the left"; and knowing the distance between
80 Chevy Chase and the corner of 18th and U, for example, a perforation would be made in the web a distance from its end corresponding to the distance that would be
85 traveled from Chevy Chase to the corner in question and the desired direction spoken into the machine. From a cylinder prepared in this manner a matrix would be made for the production of permanent records. Or,
90 the web could be perforated and the record prepared on the road, the operator stopping his machine at appropriate points, making the perforations and dictating the directions to the phonograph.

Preferably at least two sets of perforations are employed as shown to prevent undue weakening of the web. The perforations preferably should be numbered consecutively and the user will be provided with
95 a list giving the numbers of the perforations and the corresponding recorded directions, so that at any given point on the road the phonograph transmitter may be adjusted manually by means of the push-button 29,
100 to correspond with the particular perforation which bears the number shown by the list to designate the message in question, whereupon, by depressing the push-button 97, the record beginning with said perforation will be produced for the purpose of
105 testing the accuracy of adjustment of the transmitter to the web. It will be obvious that by means of said push-buttons 29 and 97 and the handles 45, 46, it will be a very
110 simple matter to position the transmitter 30 with respect to the record cylinder to correspond with the proper perforation.

Having thus described one illustrative embodiment of my invention, without however limiting myself thereto, what I claim as
120 new and desire to secure by Letters Patent is—

1. A vehicle signaling system comprising in combination a phonograph provided with
125 a record adapted for the reproduction of directions relating to a predetermined route to be followed by said vehicle, operating mechanism for said phonograph, and means driven by said vehicle relatively thereto at
130 a rate proportionate to the speed thereof

for intermittently controlling the operating mechanism of said phonograph whereby the proper directions are reproduced by said record at definite predetermined points along the route traveled by the vehicle.

2. A vehicle signaling system comprising in combination a phonograph provided with a record adapted for the reproduction of directions relating to a predetermined route to be followed by said vehicle, means normally restraining said phonograph from operation, electromagnetic means for releasing the restraining means and means driven by said vehicle relatively thereto at a rate proportionate to the speed thereof for controlling said electromagnet device whereby the proper directions are reproduced by said record at definite predetermined points along the route traveled by the vehicle.

3. A vehicle signaling system comprising in combination a phonograph provided with a record adapted for the reproduction of directions relating to a predetermined route to be followed by said vehicle, a perforated web, means for driving said web at a rate proportionate to the speed of the vehicle and means cooperating with said perforated web for controlling the operation of said phonograph whereby the proper directions are reproduced by said record at definite predetermined points along the route traveled by the vehicle.

4. A vehicle signaling system comprising in combination a phonograph provided with a transmitter and a record adapted for the reproduction of directions relating to a predetermined route to be followed by said vehicle, operative mechanism for said phonograph, means driven by said vehicle relatively thereto at a rate proportionate to the speed thereof for intermittently controlling the operating mechanism of said phonograph whereby the proper directions are reproduced by said record at definite predetermined points along the route traveled by the vehicle, manually operated means for controlling the operation of said phonograph at will and manually operated means for adjusting the position of the phonograph transmitter with respect to its record.

5. The combination with a vehicle, of a phonograph, control means therefor, means connected with a moving part of said vehicle for driving said control means at a rate proportionate to the speed of said vehicle, restraining means for said phonograph, and means governed by said control means for releasing said restraining means at predetermined intervals.

6. The combination with a vehicle, of a phonograph, control means therefor, means connected with a moving part of said vehicle for driving said control means at a rate proportionate to the speed of said vehicle, restraining means for said phonograph,

means actuated by said control means for releasing said restraining means at predetermined intervals, and manually-operated means for releasing said restraining means at will.

7. A vehicle signaling system comprising in combination a phonograph provided with a record adapted for the reproduction of directions relating to a predetermined route to be followed by said vehicle, a perforated web, a pair of rollers frictionally engaging said web, means for rotating one of said rollers at a rate proportionate to the speed of the vehicle, and means cooperating with said perforated web for controlling the operation of said phonograph whereby the proper directions are reproduced by said record at definite predetermined points along the route traveled by the vehicle.

8. A vehicle signaling system comprising in combination a phonograph provided with a record adapted for the reproduction of directions relating to a predetermined route to be followed by said vehicle, a perforated web, a pair of rollers frictionally engaging said web, means for rotating one of said rollers at a rate proportionate to the speed of the vehicle, means for disengaging one of said rollers from said web, and means cooperating with said perforated web for controlling the operation of said phonograph whereby the proper directions are reproduced by said record at definite predetermined points along the route traveled by the vehicle.

9. A vehicle signaling system comprising in combination a phonograph provided with a record adapted for the reproduction of directions relating to a predetermined route to be followed by said vehicle, a perforated web, means for driving said web at a rate proportionate to the speed of the vehicle, a platen supporting said web, a contact-maker resting on said web in line with the perforations thereof and arranged to make electrical contact with said platen through said perforations, electromagnetic means serially connected with said contact-maker and said platen, restraining means for said phonograph and mechanical connections between said electromagnetic means and said restraining means.

10. A vehicle signaling system comprising in combination a phonograph provided with a transmitter and a record adapted for the reproduction of directions relating to a predetermined route to be followed by said vehicle, and control means for said phonograph, a casing inclosing said phonograph and control means, means for driving said control means relatively to said vehicle and at a rate proportionate to the speed thereof whereby the proper directions are reproduced by said record at definite predetermined points along the route traveled by the

vehicle, manually-operated means projecting through said casing for controlling the operation of said phonograph at will, and other manually-operated means projecting through said casing for adjusting the position of the phonograph transmitter with respect to its record.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

In testimony whereof, I have hereunto subscribed my name this 10th day of July, 1914.

GEO. E. BOYDEN.

Witnesses:

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TALKING MACHINE,
1,168,239-----H.B.Babson & A. Haug,
Patented-Jan. 11, 1916.
Filed-July 17, 1909.
RENEWED-----Oct. 28, 1911.

H. B. BABSON & A. HAUG.

TALKING MACHINE.

APPLICATION FILED JULY 17, 1909. RENEWED OCT. 28, 1911.

1,168,239.

Patented Jan. 11, 1916.

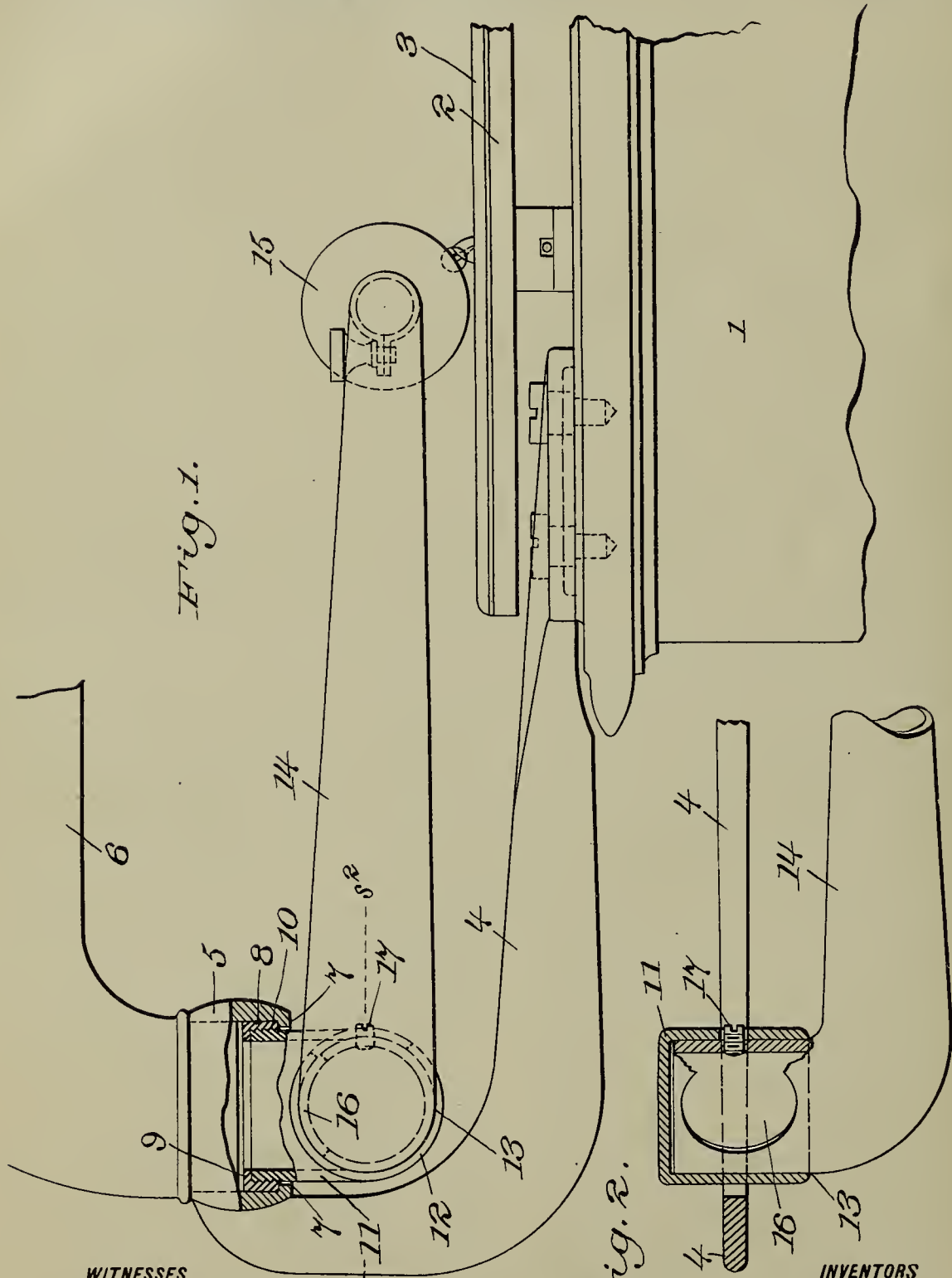


Fig. 1.

Fig. 2.

WITNESSES

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BY

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Henry B. Babson,
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UNITED STATES PATENT OFFICE.

HENRY BLAKE BABSON, OF CHICAGO, ILLINOIS, AND ANDREW HAUG, OF CALDWELL, NEW JERSEY, ASSIGNORS, BY MESNE ASSIGNMENTS, TO VICTOR TALKING MACHINE COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,168,239.

Specification of Letters Patent.

Patented Jan. 11, 1916.

Original application filed March 7, 1905, Serial No. 248,872. Divided and this application filed July 17, 1909, Serial No. 508,117. Renewed October 28, 1911. Serial No. 657,393.

To all whom it may concern:

Be it known that we, HENRY BLAKE BABSON and ANDREW HAUG, citizens of the United States, residing, respectively, at Chicago, in the county of Cook and State of Illinois, and Caldwell, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

Our invention relates to talking machines and has particular reference to the mounting of the sound conveying tube connecting the reproducer and horn, this application being a division of our application, Serial No. 248,872, filed March 7, 1905.

Ordinarily, the sound conveying tube or taper arm, as it is generally known, is mounted in a manner to permit free movement of the reproducer in planes parallel and at right angles to the surface of the record and in providing for such movements of the reproducer, various constructions have heretofore been devised, which are objectionable owing to complication and resulting cost of manufacture, accuracy of adjustment required and liability of getting out of order, difficulty of assembling parts, etc.

The present invention is designed to overcome the objections above pointed out, by producing an extremely simple and effective form of mounting, employing a minimum number of parts of simple construction, the assembling or removal of which requires neither skill, experience nor special tools and may be readily accomplished by the average user of a machine of this class.

A construction embodying our invention is illustrated in the accompanying drawings. We wish it understood however, that we do not limit ourselves to either the exact form or arrangement of parts shown, as various changes may be made therein without departing from the spirit and scope of our invention.

In the drawings, Figure 1 is a view in side elevation with parts in section, showing our invention applied to a well known type of talking machine. Fig. 2 is a horizontal sectional view, taken on the line s^2 , s^3 , of Fig. 1.

Referring now to the drawings, 1 represents a portion of the cabinet in which the motor or driving mechanism is contained.

2 is the turn-table carrying the record 3 and connected in the usual manner to be driven by the motor.

Secured to the cabinet and extending outward therefrom, there is a bracket 4, which terminates in a sleeve-like off-set 5, having the smaller end of the horn 6 loosely fitted therein in the usual manner, as shown. The sleeve is counterbored, forming a flange 7 at its lower end and free to rotate thereon there is a ring 8. The ring 8 is shouldered at 9 and internally threaded at 10 to receive the threaded end of a tubular section 11, which is screwed therein until it comes to a bearing against the shoulder 9, and thus held, is supported in suspended relation as a continuation of the horn.

The lower end 12 of the section 11 is closed as shown and in a lateral opening 13 thereof, there is fitted the main section 14 of the sound conveying tube, known generally as the taper arm and which terminates in the usual manner, at its outer end, in the sound chamber of a reproducer 15. As assembled, the adjoining ends of the tubular sections of the sound conveying tube are closed, the section 14 thereof being fitted in a lateral opening of the section 11 and provided with a similarly disposed opening 16 for the passage or transmission of sound waves from the reproducer through the horn.

A pin and slot connection, represented at 17, is employed to maintain the sections 11 and 14 in operative relation.

The manner of assembling and disconnecting the parts, the mode of operation and the many important advantages of the mechanism will be apparent from the foregoing description.

Having, therefore, described our invention, we claim:

1. In a talking machine, the combination of a horn, a supporting bracket for said horn and a sound conveying tube supported in suspended relation by said bracket and as a continuation of the horn, and having its end nearer to said horn directed laterally,

said tube being closed at said laterally directed end and provided adjacent to the closed end with an opening for the passage of sound.

2. In a talking machine, the combination of a horn, and a sound conveying tube supported in suspended relation as a continuation of the horn, and a connecting member interposed between the sound conveying tube and the horn, said connecting member being closed at one end and provided with an opening adjacent to the closed end thereof to slidably receive said tube, said tube being rotatable in said member.

3. In a talking machine, the combination of a horn, a supporting bracket for said horn, a sound conveying tube supported in suspended relation by said bracket and as a continuation of said horn, said bracket being provided with a bearing, and a member rotatably mounted on said bearing and having said tube rotatably fitted in a lateral opening thereof.

4. In a talking machine, the combination of a horn, a supporting bracket for said horn, a sound conveying tube supported in suspended relation by said bracket and as a continuation of said horn, said bracket being provided with an annular bearing portion between said horn and said sound conveying tube, and a tubular member rotatable upon said bearing and having said tube fitted free to rotate in a lateral opening thereof.

5. In a talking machine, the combination of a horn, a sound conveying tube supported in suspended relation as a continuation of the horn and each being rotatably movable in planes at right angles to each other, and a member interposed as a connection between the horn and the sound conveying tube, said member serving as a turning axis for the sound conveying tube in both vertical and horizontal directions and having a lateral opening in which said tube is rotatably fitted.

6. Sound conveying and amplifying means for talking machines comprising three tubular members, two of which are movable about a common axis and free to swing relatively to the third and are supported in suspended relation as continuations of said third member, one of the suspended members being closed at the end and provided with a lateral opening for the passage of sound waves, and for the normally freely slidable coöperation therewith of the other of said suspended members.

7. Sound conveying and amplifying means for talking machines comprising a plurality of tubular sections, two of which are movable about a common vertical axis and free to swing relatively to a third and are supported in suspended relation as continuations of such third member, one of the sus-

pended members being movable in vertical planes independently of the other suspended member.

8. In a talking machine the combination of a horn and a plurality of tubular members, movable about a common vertical axis and free to swing relatively to said horn and supported in suspended relation as continuations of such horn, one of the suspended members serving as a turning axis for the other, which other member is movable independently thereof.

9. In a talking machine, a tubular bracket interiorly flanged, an annular member rotatable on the flange, and a sectional sound conveyer supported in suspended relation from said annular member, one section of the sound conveyer being movable independently of the adjoining section thereof.

10. In a talking machine, a tubular bracket interiorly flanged, an annular member rotatable on said flange, and a movable sound conveying tube supported in suspended relation with respect to said annular member and means whereby the movement of said sound conveyer with respect to said member is limited to rotation in a substantially vertical plane.

11. In a talking machine a tubular bracket interiorly flanged, an annular member rotatable on the flange, and a sectional sound conveyer supported in suspended relation from said annular member and having one of its sections movable in a vertical plane only with respect to the other section.

12. In a talking machine, the combination of a bracket, a sound conveying tube supported in suspended relation by said bracket, a bearing carried by said bracket, and a member rotatably mounted upon said bearing and having said tube slidably fitted in a lateral opening thereof, said tube being rotatable in said opening.

13. In a talking machine, the combination of a bracket, a sound conveying tube supported in suspended relation by said bracket, a bearing carried by said bracket, and an annular member rotatably mounted upon said bearing and having said tube slidably fitted in a lateral opening thereof, said tube being rotatable in said opening.

14. In a talking machine, the combination with a ring mounted to rotate about a substantially vertical axis concentric therewith, of a sectional sound conveying tube carried by said ring and having one of its sections rotatable with respect to the other of said sections about a substantially horizontal axis, and sound reproducing means carried by and communicating with said tube.

15. In a talking machine, the combination with a stationary support, of a ring carried by said support and rotatable with respect thereto about a fixed axis, a sectional sound conveying tube carried by said ring and

having one of its sections rotatable with respect to the other of said sections about an axis transverse to said first mentioned axis, and sound reproducing means carried by said tube and communicating therewith.

16. In a talking machine, the combination with a support having an opening therein, of a hollow bushing rotatably mounted and entirely supported from within said opening and having a portion projecting outside of said opening, and a tubular sound box communicating with said bushing, and wholly supported by said projecting portion.

17. In a talking machine, the combination with a support having an opening, of a hollow bushing rotatably mounted upon a fixed axis and entirely supported from within said opening and having a portion projecting outside of said opening, and a tubular sound box arm communicating with said bushing and wholly supported by said projecting portion.

18. In a talking machine, the combination with a case, of a bracket secured thereto and extending upwardly therefrom and terminating in a tubular end, a rotatable bushing entirely supported from within said tubular end, and having an end projecting outside thereof, and a tubular sound box arm entirely supported by said projecting end.

19. In a talking machine, the combination with a tubular support, of a tubular coupling section telescopically connected at one end with said support and wholly supported thereby and extending beyond the same, means between said telescopic parts for retaining the same in telescopic association and permitting the same to have relative turning movement about one axis only, and

a tubular section adapted to carry a sound box at one end and mounted at its opposite end on one side of said coupling section to turn about an axis at right angles to the aforesaid axis, said sections and the support communicating to form a continuous sound conduit.

20. In a talking machine, the combination with a vertically disposed tubular support, of a vertically disposed tubular coupling section having a vertical opening at one end and telescopically connected at said end with said support and wholly supported thereby, means between said telescopic parts for retaining the same in telescopic association and permitting the same to have relative turning movement about a vertical axis only, said section extending beyond said support and being provided at its free end with a horizontally disposed opening, and a tubular section adapted to carry a sound box at one end and mounted at its opposite end on one side of said coupling section and having said opposite end laterally and horizontally disposed and fitting in said horizontally disposed opening to turn about an axis at right angles to the aforesaid axis, and means to hold said sections in operative relation.

In testimony whereof, I affix my signature in the presence of two witnesses.

HENRY BLAKE BABSON.

Witnesses:

FREDK. BABSON,
A. V. CHANDLER.

In testimony whereof, I affix my signature in the presence of two witnesses.

ANDREW HAUG.

Witnesses:

WALTER H. PUMPHREY,
M. G. CRAWFORD.

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ADAPTED STYLUS FOR PHONOGRAPHS,
1,168,412-----E. S. Oliver,
Patented-Jan. 18, 1916.
Filed-March 3, 1915.

E. S. OLIVER.
 ADAPTER STYLUS FOR PHONOGRAPHS.
 APPLICATION FILED MAR. 3, 1915.

1,168,412.

Patented Jan. 18, 1916.
 2 SHEETS—SHEET 1.

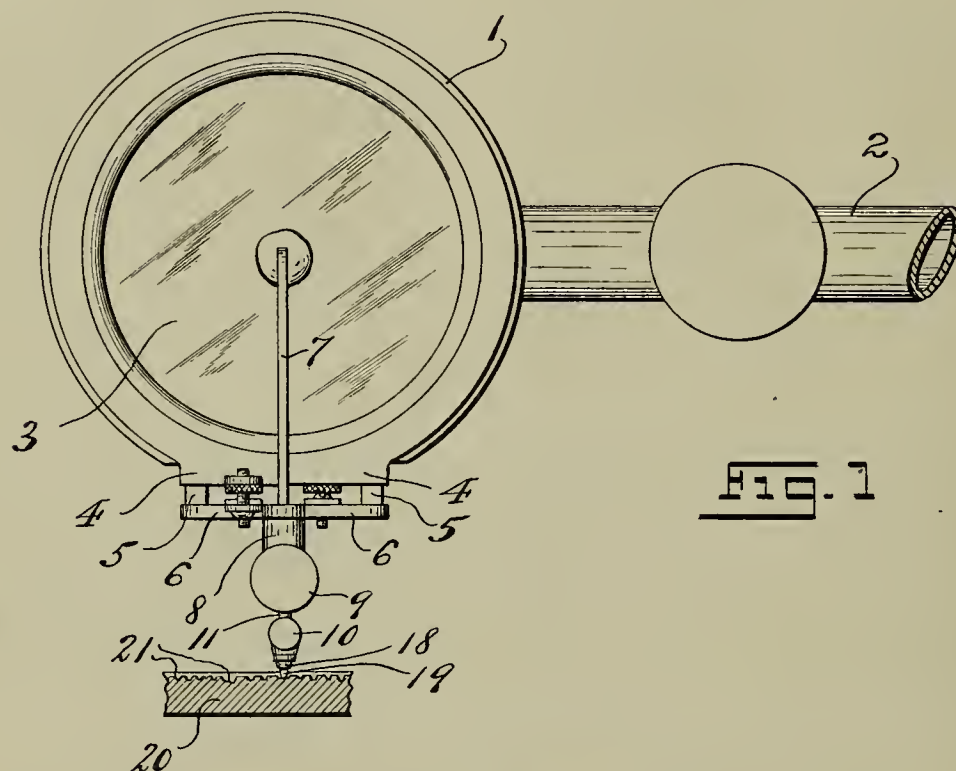


Fig. 1

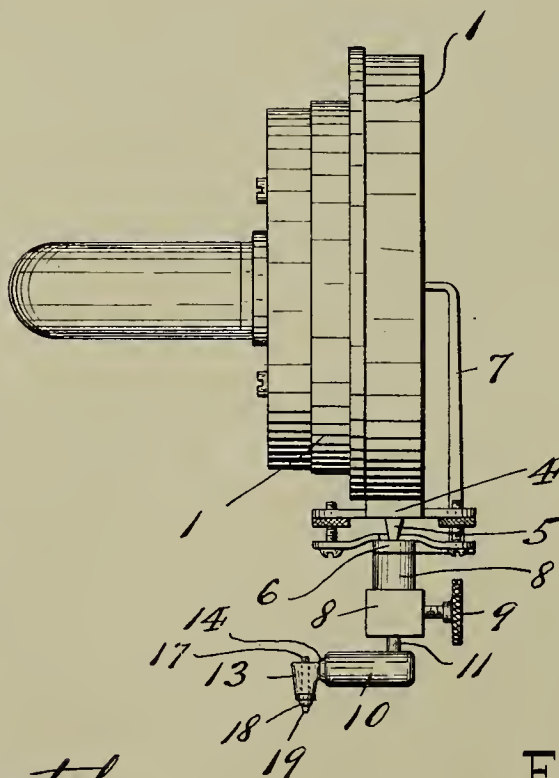


Fig. 2

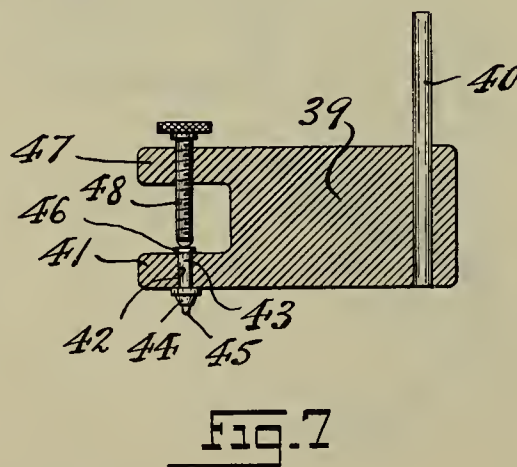
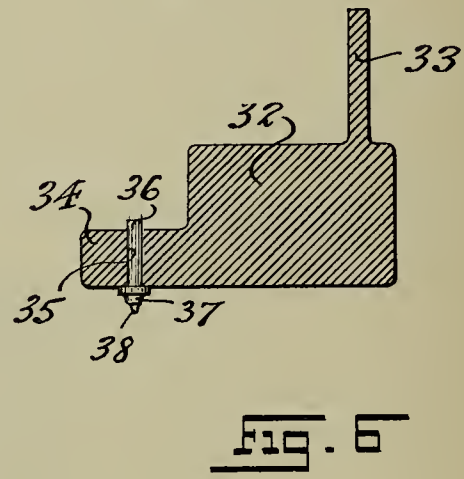
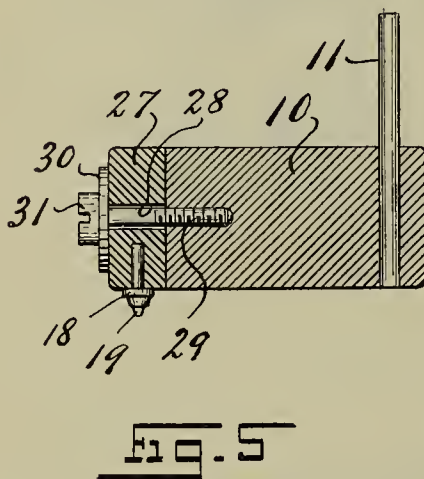
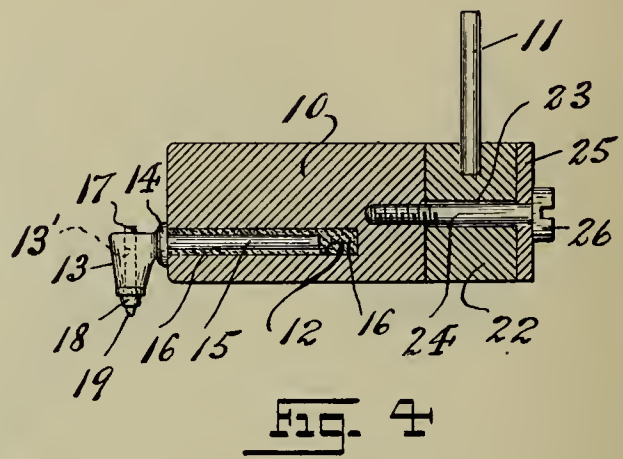
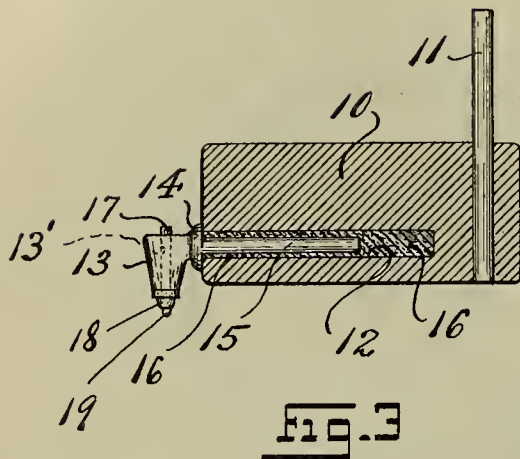
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 ADAPTER STYLUS FOR PHONOGRAPHS.
 APPLICATION FILED MAR. 3, 1915.

1,168,412.

Patented Jan. 18, 1916.
 2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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ADAPTER-STYLUS FOR PHONOGRAPHS.

1,168,412.

Specification of Letters Patent.

Patented Jan. 18, 1916.

Application filed March 3, 1915. Serial No. 11,792.

To all whom it may concern:

Be it known that I, ELLIS S. OLIVER, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Adapter-Styli for Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings and to characters of reference marked thereon, which form a part of this specification.

The present invention relates, generally, to improvements in phonograph apparatus; and the invention has reference more particularly to an adapter stylus which will operate to transmit the vertical vibrations produced by the vertical indentations of a sound-record disk to produce horizontal vibrations of a diaphragm of a reproducing sound-box set in a vertical plane.

It is well known in the art that there are two types of sound-record impressions for phonograph disks, viz., the "hill and dale" impressions which consist of a series of vertical indentations or impressions formed in the face of the disk, which, when traveling against a sound-box stylus or needle, produce vibrations of the stylus in a vertical plane, or in the plane of the vertical axis of the stylus or needle; and the horizontal or lateral impressions which consists of a series of lateral or horizontal indentations or impressions formed in the face of the disk, which, when traveling against a sound-box stylus or needle, produce vibrations of the stylus in a direction parallel to the surface of the sound-record disk. Usually in a phonograph instrument arranged to play the former type of sound-record disk, the sound-box is positioned so that the diaphragm thereof lies in a horizontal plane and substantially parallel to the disk surface, and the vertical vibrations imparted to the stylus are transmitted directly to the diaphragm; and in a phonograph instrument arranged to play the latter type of sound-record disk, the sound-box is positioned so that the diaphragm thereof lies in a vertical plane and substantially at right angles to the disk surface, and the horizontal vibrations imparted to the stylus are transmitted indirectly through a pivoted vibrator-arm,

to which the stylus is secured, to the diaphragm. Consequently the sound-box positioned and equipped for playing said latter type of sound-record disk cannot play or respond to the sound-record impressions of the former type of sound-record disk, since the vertical vibrations caused by such sound-record impressions cannot be transmitted through the ordinary stylus or needle and the pivoted vibrator-arm.

It is the principal object of my present invention, therefore, to provide an interchangeable or detachable adapter stylus adapted to be connected with the ordinary needle-socket of the vibrator-arm of a vertical sound-box, in place of the usual type of needle adapted to play horizontal sound-record impressions, so that, without other change, the vertical vibrations of the vertical or "hill and dale" sound-record impressions may be transmitted through such adapter stylus to the pivoted vibrator arm and vertical diaphragm of the vertical sound-box, so that the latter is adapted to reproduce the sounds recorded upon such type of sound-record disk.

Other objects of the present invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the present invention.

With the various objects of the present invention in view, the same consists, primarily, in the novel and simple construction of a detachable or interchangeable adapter stylus for phonograph sound-boxes, hereinafter set forth; and, the invention consists, furthermore, in the several novel arrangements and combinations of the various parts thereof, as well as in the details of the construction thereof, all of which will be more fully described in the following specification, and then finally embodied in the claims which are appended to and which form an essential part of this specification.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a face view of a vertical sound-box, the vibrator-arm of which is equipped with the novel construction of adapter stylus made according to and embodying the principles of the present invention, in this view the said adapter stylus being shown in contact with the vertical sound-record impressions of a "hill and dale" sound-record disk, the latter being shown in section. Fig.

2 is an edge side view of said vertical sound-box so equipped. Fig. 3 is a longitudinal vertical section of an adapter stylus made according to and embodying the principles of the present invention, the same being drawn on an enlarged scale. Fig. 4 is a longitudinal section of a modified construction of said novel adapter stylus. Fig. 5 is a similar view of another modified construction of said novel adapter stylus. Figs. 6 and 7 are, respectively, longitudinal sections of still further modified constructions of the novel adapter stylus.

Similar characters of reference are employed in all of the hereinabove described views to indicate corresponding parts.

Referring now to the said drawings, the reference character 1 indicates a sound-box for playing sound-record disks, said sound-box being so connected with the tone-arm 2 of a phonograph apparatus as to be positioned vertically to dispose the diaphragm 3 thereof in a vertical plane at right angles to the horizontal plane of the sound-record disk, adapted to be revolved beneath said sound-box.

Connected with the lower side 4 of said sound-box are the fulcrum-projections or points 5 upon which is fulcrumed the pivot-frame 6 of an upwardly extending vibrator-arm 7, the upper end of which is connected with the diaphragm 3 in the usual manner. Connected with and extending downwardly from said pivot-frame 6 is the needle or stylus socket 8, which receives and securely connects in operative relation to said vibrator-arm a needle or stylus adapted to contact operatively with the sound-record impressions of a sound-record disk. Said needle or stylus socket 8 is provided with the usual set-screw or lock-screw 9 for securing the needle or stylus in the socket 8.

When reproducing from a sound-record disk in which the sound-record impressions are of the horizontal or lateral form, a straight vertically extending needle or stylus is secured in the socket 8, the same being in vertical alinement with the fulcrum-projections or points 5, so that the lateral or horizontal vibrations imparted to the needle or stylus point cause a rocking of the pivot-frame 6 which transmits similar horizontal or lateral vibrations to the vibrator-arm 7 which in turn vibrates the diaphragm 3 to reproduce the recorded sounds from the sound-record impressions.

It will be apparent that, with the type of sound-box, constructed as above described, equipped with a straight needle or stylus as above mentioned, a sound-record formed with vertical or "hill and dale" sound-record impressions could not be played or its sound-record reproduced, since such vertical or "hill and dale" sound-record impressions would cause a vertical vibration of

the needle or stylus point, that is a vibration parallel to the axis of the needle or stylus and in line with the fulcrum-projections or points 5. Consequently no rocking or oscillation of the vibrator-arm 7 would result, but merely a vertical rise and fall of the entire sound-box bodily, with no vibratory effect upon the diaphragm 3. It is therefore necessary to provide an adapter stylus, which can be used in place of the ordinary straight needle or stylus so that through such means either the vertical or "hill and dale" sound record impressions may be utilized to operate the diaphragm 3 to play or reproduce the sound-record. My present invention provides such an adapter stylus which is of novel and simple construction, and which may be interchangeably used in place of said straight needle or stylus in connection with the socket 8 of the vibrator-arm 7 of the same type of sound-box.

My novel adapter stylus comprises a horizontally extending main-body 10, of any desirable cross-sectional shape. Connected rigidly with and extending upwardly from one end of said main-body 10, and at right angles to the axis thereof, is a butt-piece or shank 11 of a proper diameter to be received or inserted in the socket 8 of the vibrator-arm 7, by which means the adapter stylus is operatively secured to the vibrator-arm 7 in substantially the same manner as an ordinary straight needle or stylus. Formed in the outer or free end of said main-body 10 is a longitudinally extending tubular opening 12. The reference character 13 indicates a stylus-head, the same having a shoulder 14 at one side from which extends a horizontal shank-piece 15. The said shank-piece 15 is smaller in diameter than the diameter of said tubular opening 12 into which said shank-piece 15 is inserted. Said tubular opening 12 is filled with a plastic or cementitious material 16 which will harden, but which when hardened possesses a certain limited degree of resiliency, and I have found in practice that shellac, collodion and asphaltum, are substances which provide the qualities I seek for this purpose, and no doubt there are many other similar substances which can be used for the purpose. Into this plastic or cementitious material the shank-piece 15 is pressed, so that it is surrounded thereby, and is thus securely affixed to said main-body 10, but is at the same time capable, by reason of such a manner of connection, of a limited resiliency relatively to said main-body 10 which results in a softening or sweetening of the tones produced by the sound-box diaphragm when vibrated by my novel adapter stylus. In other words the harshness, clang, and metallic sounds usually incident, more or less, to phonographic reproduction, is practically eliminated. Said stylus-head 13 is

provided with a vertically extending opening or socket 13' extending therethrough. Into this opening is inserted the upwardly extending tail-piece 17 of a stylus-point setting 18, which extends and is positioned in a plane below the under side of said main-body 10. The stylus-point 19 is fixed in said setting 18, and may be made of any suitable material, preferably of diamond or emerald.

The operation of my novel adapter stylus is as follows:—The butt-piece 11 is inserted in the socket 8 of the vibrator-arm 7 and locked rigidly thereto by means of the set-screw or lock-screw 9. When thus secured the main-body 10 extends horizontally beneath said sound-box and at right angles to the fulcrum-projections or points 5 thereof. As thus positioned the stylus-point 19 carried at the free end of said main-body 10 is off-set or positioned to one side of the pivot or fulcrum axis of the vibrator-arm 7. Now when a sound-record disk 20 provided with vertical or "hill and dale" sound-record impressions 21 is revolved beneath said stylus-point 19 and in contact therewith, a vertical vibration or oscillation of said stylus-point 19 is produced, which effects a vertical vibration or oscillation of the outer end of said main-body 10, but since the stylus-point 19 is off-set from the fulcrum-projections or points 5 of the sound-box this vertical vibration or oscillation when transmitted through said off-set horizontal main-body is translated into a horizontal vibration or oscillation of the socket 8, pivot-frame 6 and vibrator-arm 7, so that the upper end of the latter is vibrated horizontally to produce the proper vibratory effect of the diaphragm 3 of the sound-box. In simple terms instead of the vibration of said vibrator-arm 7 being effected by a simple lever oscillation, it is effected, as a result of the off-set construction of the adapter stylus, by a bell-crank lever oscillation.

Referring now to Fig. 4 of the drawings, I have illustrated a slight modification of the construction of my novel adapter stylus. In this construction I provide a means for pivotally associating the butt-piece or shank 11 to the main-body 10, so that if the vibrator-arm 7 does not happen to be positioned perpendicularly to the sound-record disk, by reason of any shifted position of the sound-box, the main-body 10 may be adjusted so that the stylus-point 19 may be properly presented perpendicularly to or vertically to the sound-record disk, which position is essential to its proper tracking and operation in connection with the impressions of the sound-record disk. To this end a butt-block 22 having a horizontal opening 23 therein is pivoted upon a clamp-screw 24 which screws into the end of the main-body 10. A

washer 25 is interposed between the head 26 of said clamp-screw 24 and said butt-block 22. The butt-piece or shank 11 extends upwardly from said butt-block 22. Said butt-piece or shank 11 may be adjusted or accommodated to the angular disposition of the socket of the vibrator-arm, and when thus properly positioned the clamp-screw 24 is tightened thus firmly and rigidly binding the butt-block 22 and butt-piece 11 in the desired position.

The same result as immediately above described may be secured by means of the modified construction illustrated in Fig. 5 of the drawings. In this construction the butt-piece or shank 11 is affixed to the main-body 10, and to the outer end of said main-body 10 is connected an adjustable stylus-block 27, the same having a horizontal opening 28 and being pivoted upon a clamp-screw 29 which screws into the outer end of said main-body 10. A washer 30 is interposed between the head 31 of said clamp-screw and said stylus-block. The stylus-point setting 18 is inserted in said stylus-block so as to project its stylus point 19 downwardly therefrom. Said stylus-point 19 may then be adjusted to proper vertical or perpendicular relation to the sound-record disk by turning said stylus-block and clamping the same in the desired position by means of the clamp-screw, thus correctly positioning the stylus-point regardless of any angular disposition of the butt-piece or shank 11.

Referring now to Fig. 6 of the drawings, there is shown therein another modified construction of my adapter stylus, the same comprising a horizontal main-body 32 from one end of which extends outwardly and at right angles thereto an integrally formed butt-piece or shank 33. The forward end of said main-body 32 is provided with a reduced portion 34 in which is formed a vertically disposed opening 35 for the reception of the tail-piece 36 of a stylus-point setting 37 in which the stylus-point 38 is fixed. This arrangement provides a very cheap and simple construction of adapter stylus which embodies all the essential principles of my invention.

Referring now to Fig. 7 of the accompanying drawings, I have illustrated therein still another modified form of my novel adapter stylus. In this form I provide a horizontal main-body 39 from one end of which extends upwardly at right angles thereto a rigidly secured butt-piece or shank 40. Extending outwardly from the outer end of said main-body 39 is a reduced portion 41 provided with a vertical opening 42 in which is secured the tail-piece 43 of a stylus-point setting 44 having the stylus-point 45 affixed therein. The end of said tail-piece 43 projects above the upper sur-

face of said reduced portion 41 and is flanged or beaded as at 46. Also extending outwardly from the outer end of said main-body 39 is another reduced-portion 47 which
 5 is spaced above and away from said first mentioned reduced-portion 41. In said reduced-portion 47 is adjustably arranged an adjuster-screw 48 the free end of which may be moved into binding or clamping relation
 10 to the beaded end of said tail-piece of the stylus-point setting. If this adjuster-screw 48 is moved against said tail-piece and tightened the tendency is to prevent any loss of the vibratory effects of the stylus-point
 15 through lost motion and consequently a louder tone production at the diaphragm of the sound-box. If, however, the adjuster-screw 48 is loosened a consequent reduction of the force of the vibrations results, through
 20 lost motion in the mounting of the stylus-point setting, and consequently there is reduction of the force of the vibratory effects transmitted to the diaphragm of the sound-box and consequently a reduction of tone
 25 volume or loudness.

I am aware that some changes may be made in the various arrangements and combinations of the various devices and parts, as well as in the details of the construction
 30 thereof, without departing from the scope of my present invention. Hence, I do not limit my invention to the exact arrangements and combinations of the said parts as described in the foregoing specification, nor
 35 do I confine myself to the exact details of the construction of said parts as shown in the accompanying drawings.

I claim:—

1. An adapter stylus for phonograph
 40 sound-boxes having their diaphragms in planes substantially perpendicular to the sound-record disks to be reproduced comprising a horizontal body, a vertical butt-piece extending upwardly from one end of
 45 said body, a stylus-head having a laterally

extending shank, said body having a longitudinally extending opening extending inwardly from its outer end for the reception of said shank, means for securing said shank in said opening, a vertically disposed stylus-
 50 setting supported by said stylus-head, and a downwardly depending vertical stylus-point carried by said setting.

2. An adapter stylus for phonograph sound-boxes having their diaphragms in
 55 planes substantially perpendicular to the sound-record disks to be reproduced comprising a horizontal body, a vertical butt-piece extending upwardly from one end of said body, a stylus-head having a laterally
 60 extending shank, said body having a longitudinally extending opening extending inwardly from its outer end for the reception of said shank, a plastic cementitious material having some resiliency filling said open-
 65 ing and surrounding said shank whereby the latter is secured in said body, a vertically disposed stylus-setting supported by said stylus-head, and a downwardly depending vertical stylus-point carried by said set-
 70 ting.

3. An adapter stylus for phonograph sound-boxes having their diaphragms in
 75 planes substantially perpendicular to the sound-record disks to be reproduced comprising a horizontal body, a vertical butt-piece extending upwardly from one end of said body, a vertical stylus-point extending downwardly from the opposite end of said body, and means permitting adjustment of
 80 said butt-piece relatively to the stylus-point as and for the purposes described.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 27th day of February, 1915.

ELLIS S. OLIVER.

Witnesses:

FREDK. C. FRAENTZEL,
 FRED'K H. W. FRAENTZEL.

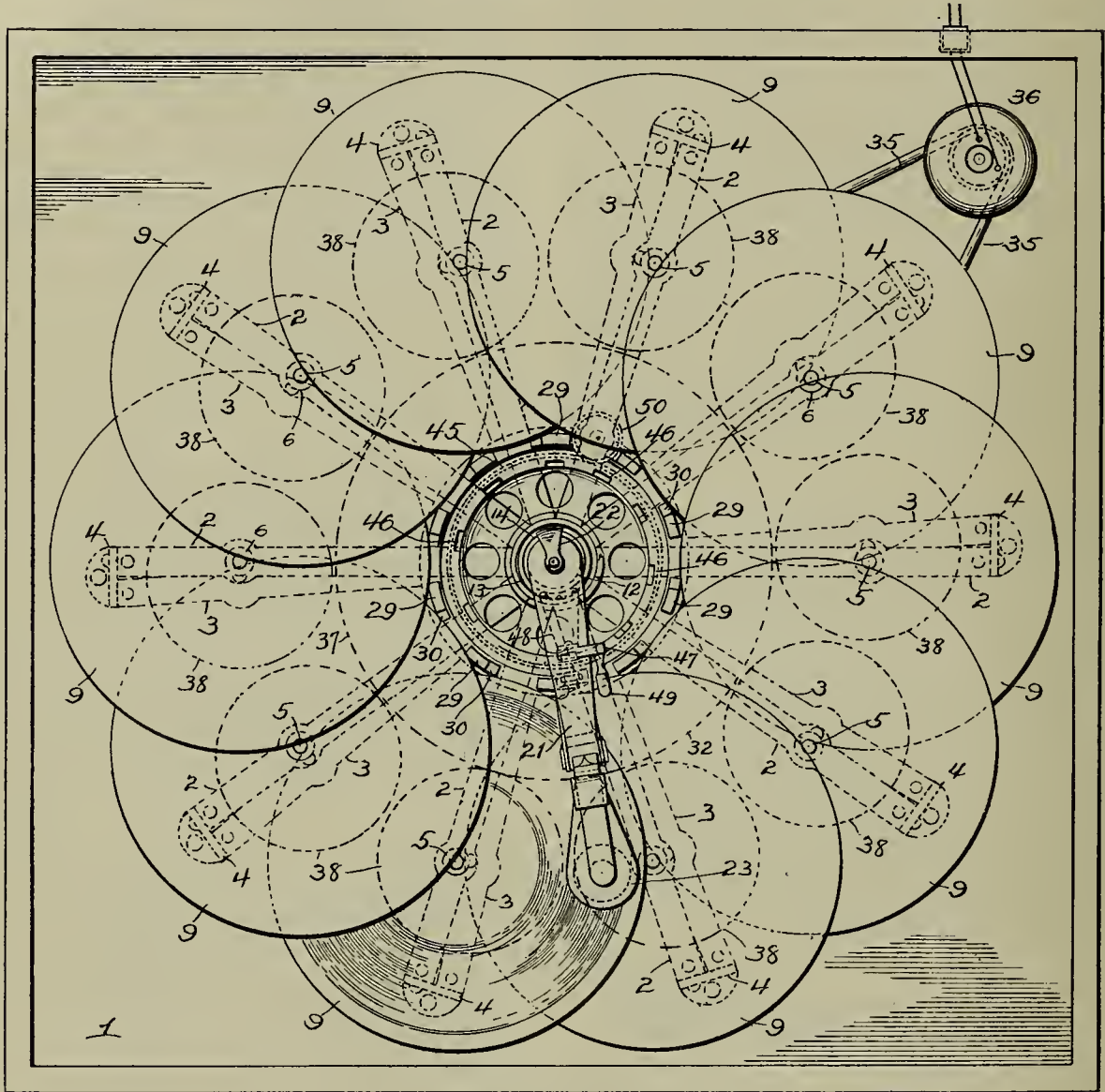
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE,
1,168,606-----W. H. Daily,
Patented-January 18, 1916.
Filed-February 23, 1915.

W. H. DAILY.
TALKING MACHINE.
APPLICATION FILED FEB. 23, 1915.

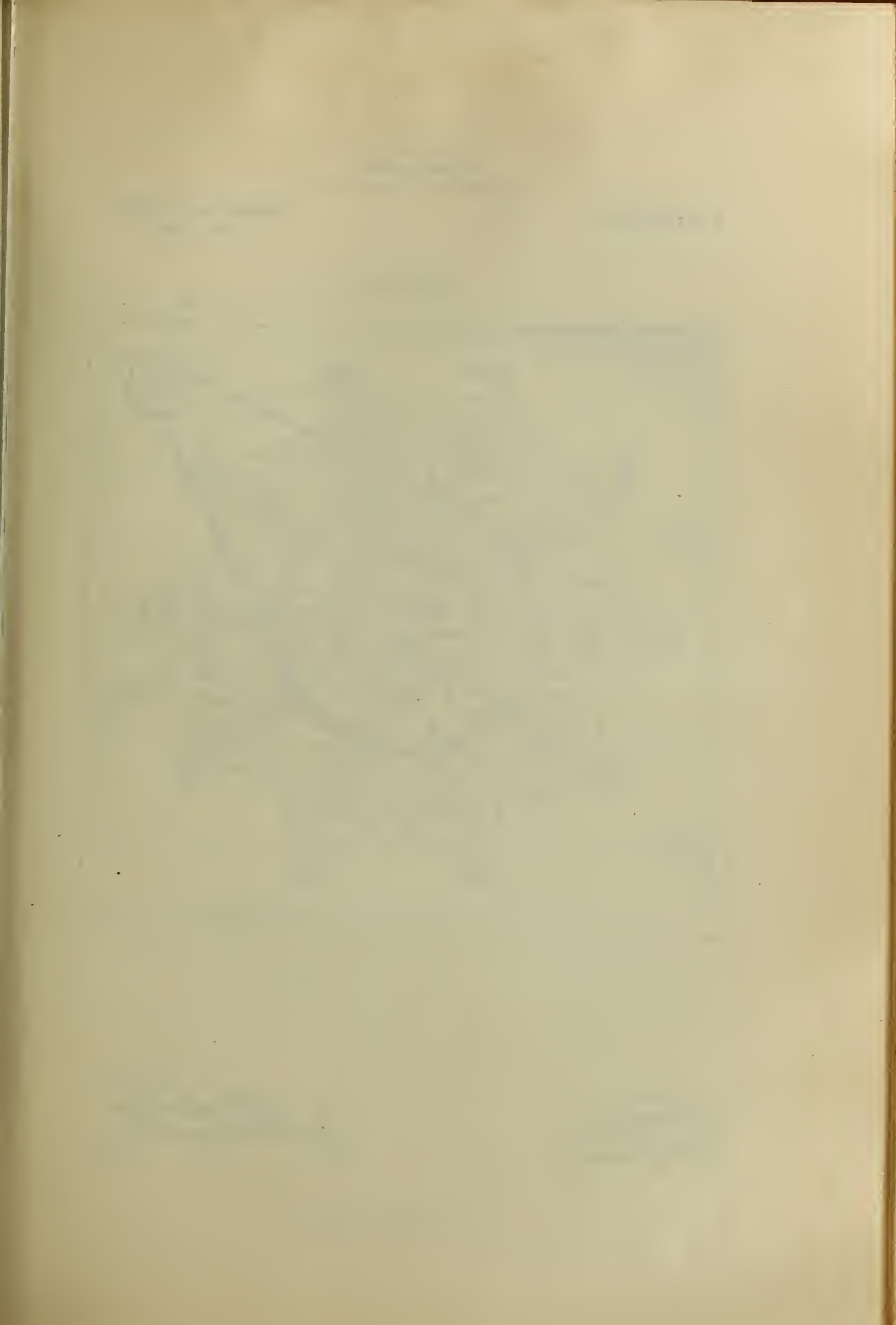
1,168,606.

Patented Jan. 18, 1916.
3 SHEETS—SHEET 1.



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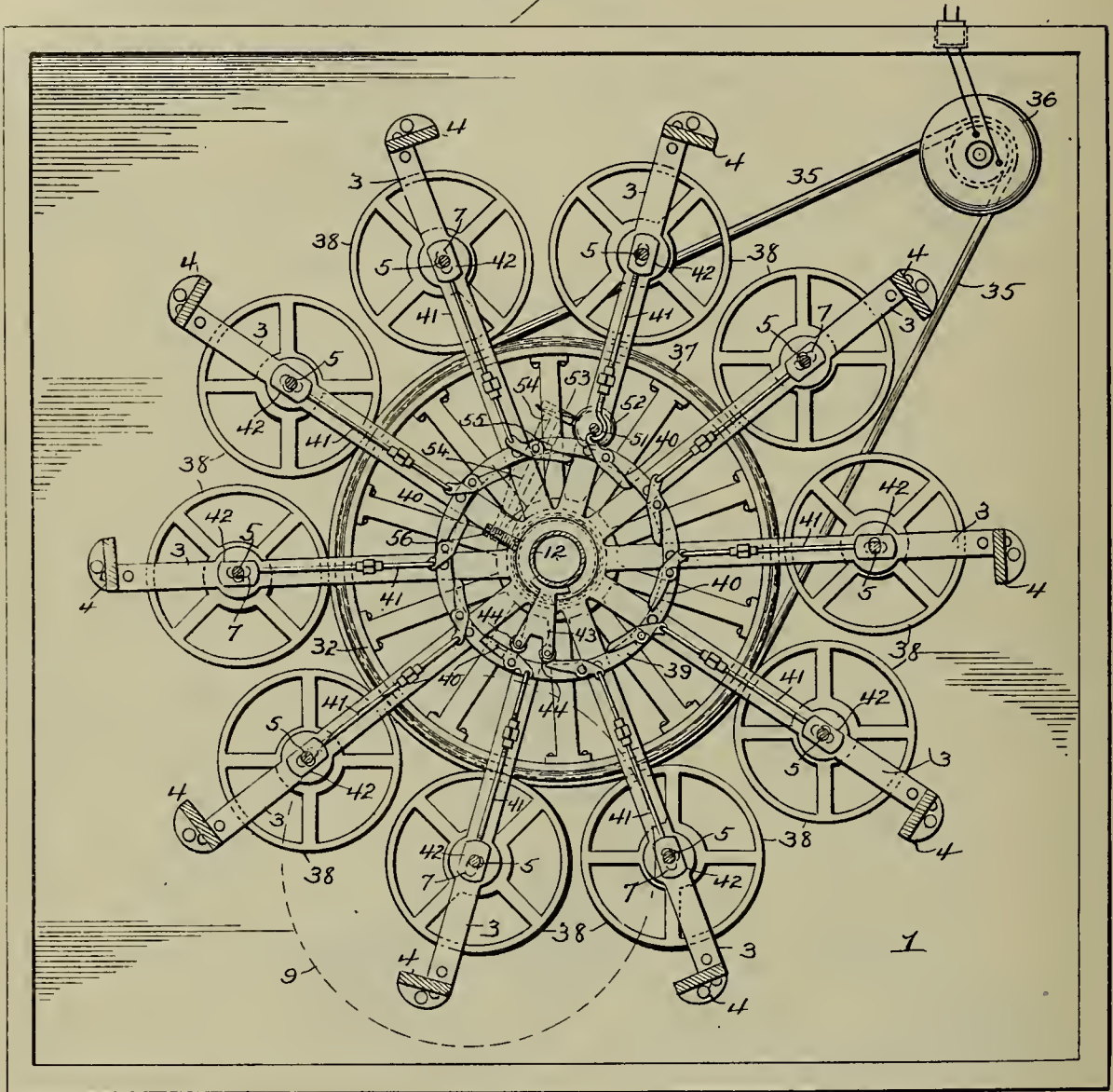


W. H. DAILY.
TALKING MACHINE.
APPLICATION FILED FEB. 23, 1915.

1,168,606.

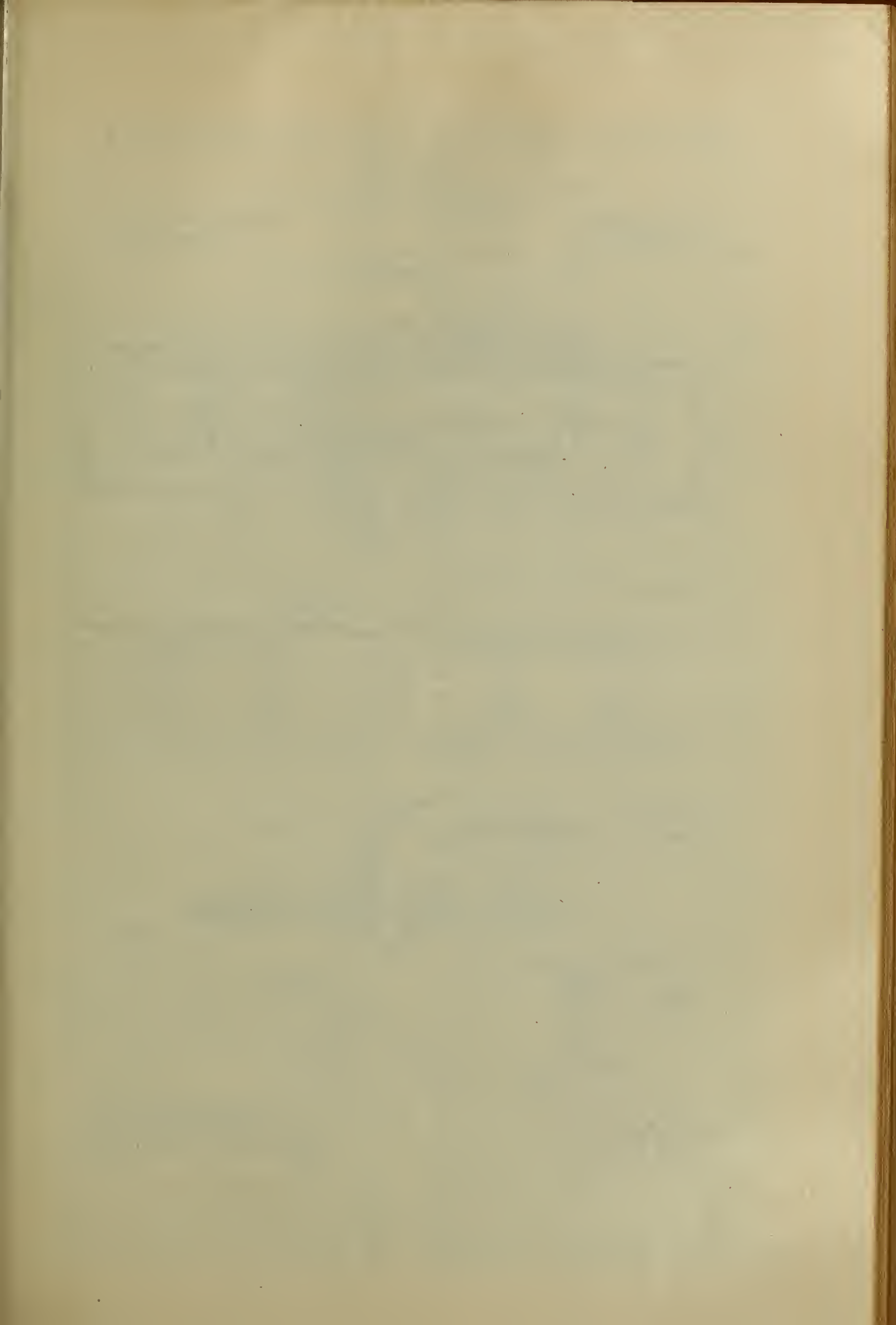
Patented Jan. 18, 1916.
3 SHEETS—SHEET 2.

Fig. 2 -



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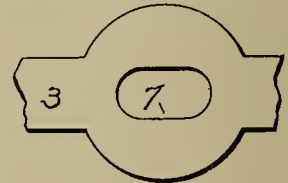
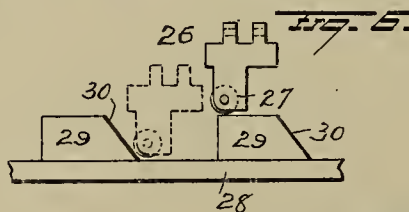
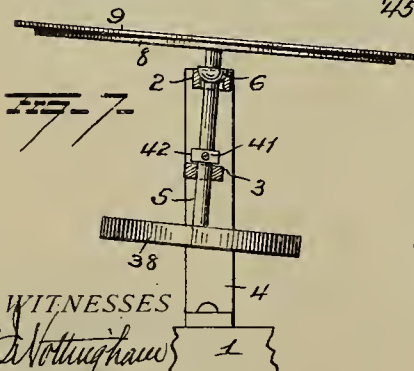
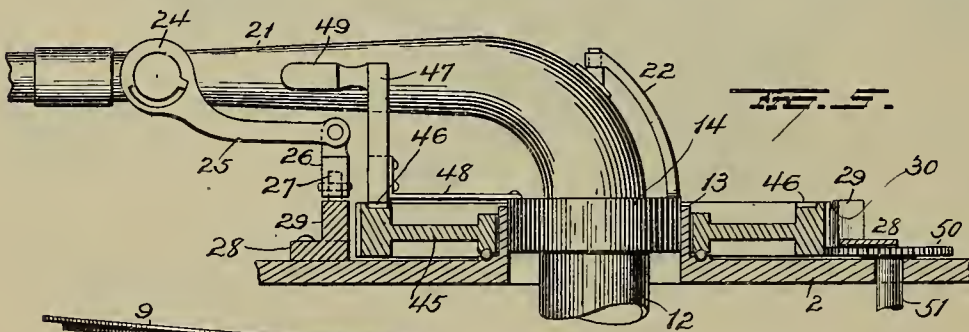
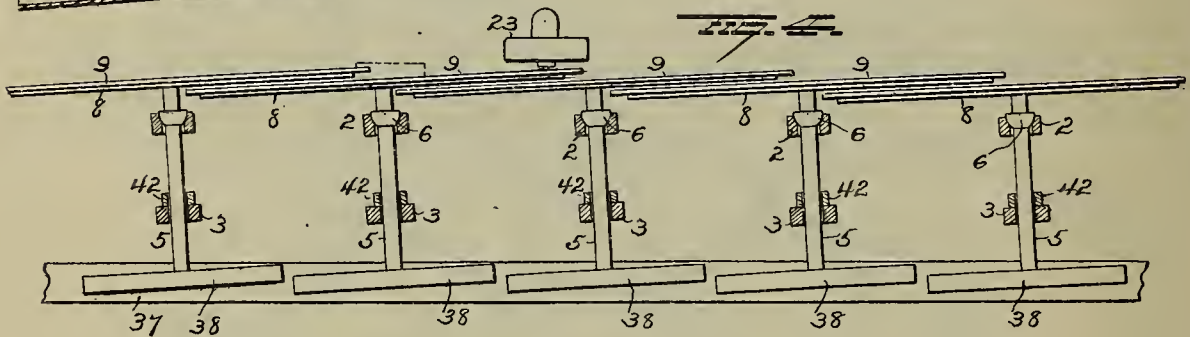
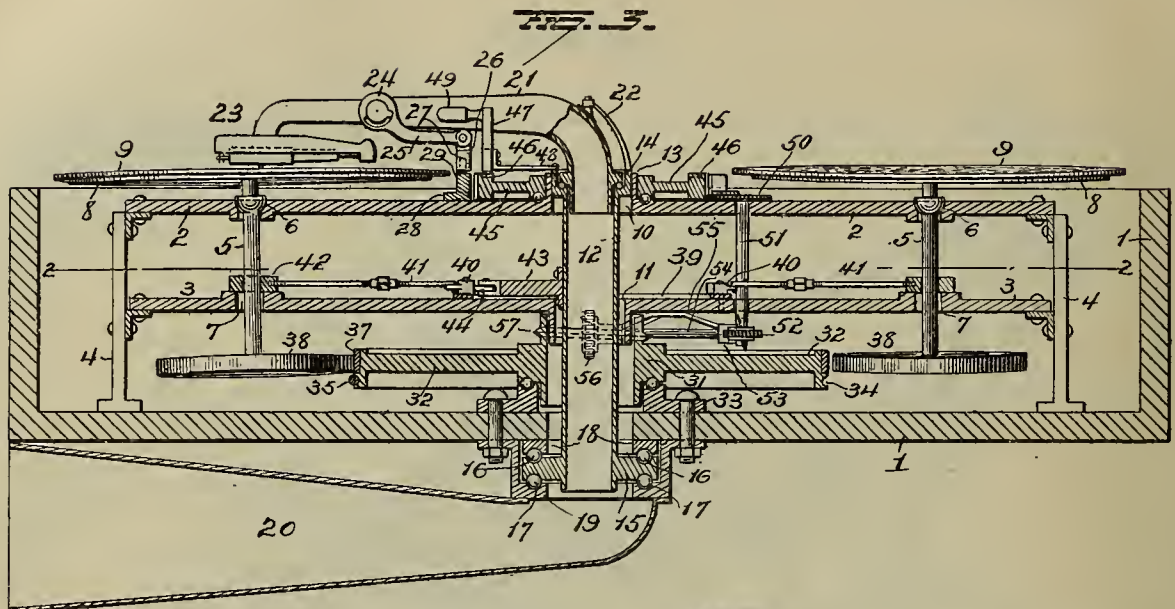


W. H. DAILY.
TALKING MACHINE.
APPLICATION FILED FEB. 23, 1915.

1,168,606.

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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

WILLIAM H. DAILY, OF TUCSON, ARIZONA.

TALKING-MACHINE.

1,168,606.

Specification of Letters Patent.

Patented Jan. 18, 1916.

Application filed February 23, 1915. Serial No. 10,073.

To all whom it may concern:

Be it known that I, WILLIAM H. DAILY, a citizen of the United States, and a resident of Tucson, in the county of Pima and State of Arizona, have invented certain new and useful Improvements in Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in talking machines, and more particularly to such as employ a plurality of records which may be played successively,—one object of the invention being to provide means which will operate automatically to cause the playing of a plurality of records successively without the necessity of shifting the records from their supporting tables.

A further object is to provide a multi-record talking machine with means which will operate automatically to shift the reproducer from one record to the other, whereby the several records may be played successively.

A further object is to so construct a multi-record talking machine, that it will operate automatically to cause the rotation of one record at a time and to shift the reproducer progressively from one record to another.

A further object is to so construct the machine that the rotation of one record will be stopped and the rotation of the next record will be started when the reproducer is automatically shifted from one of said records to the other.

A further object is to so construct a talking machine of the disk-record type, as to overcome the effect of centrifugal force tending to cause the needle of the reproducer to engage only the outer wall of the record groove, and thus insure the proper and accurate maintenance of the needle in said record groove.

With these and other objects in view, the invention consists in certain novel features of construction and combinations of parts as hereinafter set forth and pointed out in the claims.

In the accompanying drawings; Figure 1 is a plan view of a talking machine embodying my improvements; Fig. 2 is a horizontal sectional view on the line 2—2 of Fig. 3; Fig. 3 is a transverse vertical section; Fig. 4 is a view partly in section and partly in elevation showing the relative arrangement

and disposition of the record disks and their supporting means, this view being diagrammatical in character and showing several disks and their supporting and driving means in a straight line instead of in their normal circular arrangement; Fig. 5 is an enlarged section view, partly in elevation, showing the horn tubes and cooperating parts at the central portion of the machine, and Figs. 6, 7 and 8 are detail views.

1 represents a casing, in which upper and lower frames 2, 3, are located, each of said frames comprising a circular series of radiating arms or bars supported at their outer ends by standards 4. In the drawing, each frame is shown as comprising ten arms or bars and the axes of the arms or bars of the lower frame are somewhat out of vertical alinement with the arms or bars of the upper frame, as shown in Figs. 4 and 7, so that shafts 5 passing through the pairs of superimposed bars of the respective frames will be disposed in inclined positions, for a purpose hereinafter explained. Ball-and-socket bearings 6 are provided for the shafts 5 in the bars of the upper frame, and the bars of the lower frame are made with slots 7 for the passage of the shafts,—said slots being elongated in a direction at substantially right angles to the direction of inclination of said shafts. The several upright shafts 5 carry platforms 8 at their upper ends for the reception of phonograph record disks 9, each of said platforms being disposed at right angles to the axis of the shaft 5 to which it is secured. It will be observed that the disk supporting platforms are arranged in annular or circular formation; that the shafts 5 are located in such proximity to each other as to cause the platforms and the record disks thereon to progressively overlies each other, and that as said platforms and disks are inclined in directions approximately at right angles to lines radiating from the common vertical axis of the two frames 2—3, all of the disks of the circular series will be in approximately the same general plane with the peripheral portions of all the disks approximately equal distances from the central portions of adjacent disks, and thus the accuracy of the shifting of the reproducer progressively from disk to disk, as hereinafter explained, will be facilitated. Inclining the record disks as above described also is of

great advantage in insuring accuracy and clearness of phonographic reproduction. It has been the common practice to dispose disk records in a horizontal plane and the consequence of this is that, owing to centrifugal force during the rotation of the disk, the needle of the reproducer will tend to press outwardly and thus bear with greatest pressure against the outer wall of the groove of the record. By inclining the disk, such effect of centrifugal force is overcome, and the reproducer needle is caused to accurately follow the groove throughout its varied contour.

The central portions of the respective frames are made with openings 10—11 for the accommodation of a vertical horn tube 12, and surrounding the opening 10 of the upper frame is an annular flange 13 in which a recessed head 14 at the upper end of said horn tube is mounted to rotate. The lower end of the horn tube 14 is provided with a circular flange 15 having grooves in its upper and lower faces for the accommodation of antifriction balls 16—17,—the balls 16 also having bearings in a grooved ring 18 on the bottom of the casing 1 and the balls 17 having bearings in a groove in a flanged ring 19 also secured to the bottom of the casing. To the flanged ring 19, the smaller end of a horn 20 is secured so as to communicate with the lower end of the rotatable horn tube 12. The depending elbow of a tubular arm 21 has a ball-bearing mounting in the head 14 at the upper end of the vertical horn tube, and said tubular arm, which constitutes an upper member of the horn tube is supported by an arm 22 projecting upwardly from the head 14. The tubular arm or horn tube extension is disposed horizontally and constitutes the carrier for the reproducer 23, the tubular shank of the latter being connected with the arm 21 by means of a tubular coupling 24 hinged to the latter in such manner as to permit the reproducer to be raised. During the operation of the machine, the reproducer will be raised from one record and subsequently lowered upon the next record, and to accomplish these movements automatically, the hinged coupling 24 with which the reproducer is connected, is provided with an arm 25 to which a weight 26 is attached, said weight having a roller 27 to engage a ring 28 located upon the upper frame 2 and provided with a plurality of lugs 29 each having a forwardly inclined wall 30. When tubular arm 21 shall have moved over the disk until the reproducer shall have fully passed over the record groove on a disk 9, the weight 26 will drop in a space between two lugs 29 on ring 28 and thus operate, through the medium of the arm 25 and tubular hinged coupling 24, to raise the reproducer off the disk, and as said arm or

horn tube extension 21 continues to move laterally, the roller 27 on weight 26, will ride up the inclined face 30 of the next lug 29 and thus cause the reproducer to be lowered and placed in operative relation to the next disk 9 of the series,—all as more particularly hereinafter pointed out.

The hub 31 of a horizontally disposed driving wheel 32 encircles the vertical horn tube 12 and has an anti-friction bearing upon a ring 33 secured within the bottom of the casing 1. The wheel 32 is made with a peripheral groove 34 to receive a driving belt 35, by means of which, motion is imparted to said wheel from a motor 36, the latter being preferably an electric motor. The wheel 32 is also provided with a peripheral facing 37 of leather or other friction material to insure proper transmission of power to wheels 38 at the lower ends of the shafts 5 for the purpose of rotating the record disks.

Means are provided for causing the rotation of one record disk at a time during the playing of a record,—all of the other disks remaining idle,—and to throw said record disks progressively into and out of operation.

The devices whereby these operations are accomplished automatically, will now be explained. A ring 39 concentric with the vertical horn tube 12 is mounted upon the bars of the lower frame 3 and to this ring, a plurality of small levers 40 are pivotally connected, said levers corresponding in number with that of the disk carriers employed. The short arms of the levers 40 are connected, by means of adjustable rods 41 with blocks 42 freely mounted upon the bars of frame 3 and perforated for the passage of the shafts 5. An arm 43 is rigidly secured to the vertical horn tube 12 so as to move laterally when said tube turns during the travel of the reproducer over a record disk. The arm 43 is preferably bifurcated at its free end and in each member of this bifurcated portion, a roller 44 is mounted to engage the long arms of the levers 40. During the operation of the machine, the engagement of the rollers 44 on arm 43 with the long arm of one of the levers, will cause the block 42 connected with this lever to be moved inwardly and the wheel 38 on the shaft 5 engaged by said block will be moved into contact with the friction face 37 of the driving wheel 32,—thus causing the record disk carried by said shaft to be rotated. When the playing of this disk shall have been completed, and the reproducer is being transferred to the next record disk, the rollers of the arm 43 will leave the lever 40 with which they had been in engagement, (thus releasing said lever and permitting the wheel 38 to move, by the action of gravity, away from the driving

wheel and the disk carried by this shaft to be stopped) and engage the next lever 40 and throw the next record disk into operation, in the same manner as previously explained.

It is apparent that means must be provided to cause the reproducer to move laterally so that it may be transferred from one disk to another when raised as previously explained. The means which I employ for moving the reproducer and the horn tubes with which the same is connected, will now be described. A gear wheel 45 is mounted horizontally upon the upper frame 2 and in its upper face near its toothed periphery, this wheel is provided with a plurality of notches 46 corresponding in number with that of the record disks employed. A pusher 47 is adapted to engage in any one of the notches 46 and is retained therein by a spring arm 48 by means of which said pusher is carried, the inner end of said spring arm being secured to the head 14 at the upper end of the vertical horn tube 12. The pusher engages one side of the horizontal horn arm 21 so as to move the same (and the reproducer carried thereby) laterally when the gear wheel 45 is slowly turned as presently explained.

It may sometimes be desired to play the same record twice, or to play some particular record in the series without successively playing the others. This may be accomplished by manually moving the reproducer and its horn tubes, and to facilitate such manual manipulation, the pusher 47 is provided with a handle 49 whereby it may be raised out of engagement with the notched wheel 45 and moved to another notch in said wheel opposite the disk which it is desirable to play,—the reproducer being also moved (manually) to proper position over such disk. When the reproducer is thus manually manipulated, the vertical horn tube 12 will be rotated and the coöperation of the arm 43 with the proper lever 40 will cause the disk it may be desired to play to be rotated in the manner previously explained.

The gear wheel 45 receives motion from a pinion 50 carried at the upper end of a shaft 51 mounted in the frames 2—3. The lower a worm 57 on the hub of the drive wheel 32. which receives motion from a worm 53 on a horizontal shaft 54, mounted in a bracket 55. A worm wheel 56 is fixed to the other end of the shaft 54 and receives motion from a worm 57 on the hub of the drive wheel 52.

It will require approximately one hour for the successive playing of ten records (including the time necessary for the transference of the reproducer from disk to disk) and consequently the gearing above described for moving the pusher 47 is so proportioned and timed that the gear wheel 45 will be caused to move very slowly in making

one complete revolution in approximately one hour.

In operating the machine, all that is necessary, when the reproducer is properly set with respect to one of the disks, is to start the electric motor. The reproducer will move over the record toward the center thereof, and when the needle shall have fully traced the groove, the inclination of the disk will permit the reproducer to move promptly to the center of the disk, at which time the reproducer will be raised automatically by the operation of the devices hereinbefore described, and then lowered upon the next disk near the peripheral portion thereof, when the inclination of this disk will permit the needle of the reproducer to promptly move to the groove in the disk. In the meantime the rotation of the first disk will have been stopped and the rotation of the next disk started, in the manner previously explained.

Various slight changes might be made in the details of construction of my invention without departing from the spirit thereof or limiting its scope and hence I do not wish to restrict myself to the precise details herein set forth.

Having fully described my invention what I claim as new and desire to secure by Letters Patent, is:—

1. A talking machine comprising a circular series of record supports, operating means therefor, a reproducer mounted concentrically within said circular series of record supports, and means operating automatically to move the reproducer successively from one record to another.

2. A talking machine comprising a circular series of record supports, means for rotating said supports successively, a reproducer mounted concentrically within said circular series of record supports, and means for moving said reproducer successively from one record to another.

3. A talking machine comprising a circular series of record supports, driving means common to all of said supports, means operating automatically to bring said supports into and out of operative relation to said driving means successively, a reproducer mounted concentrically within said circular series of record supports, and means operating automatically to shift said reproducer successively from record to record.

4. A talking machine comprising a circular series of overlapping inclined record disks, a support for each disk, means for rotating said supports successively, a reproducer mounted concentrically within said circular series of record supports, and means operating automatically to shift said reproducer successively from one record disk to another.

5. A talking machine comprising a plural-

ity of supports for record disks, means for rotating said supports, a pivotally mounted horn arm, a member hinged to said horn arm, a reproducer carried by said hinged member, a weighted arm connected with said hinged member, and means with which said weighted arm coöperates to raise the reproducer from one record disk and deposit it upon another, and means for simultaneously moving said reproducer and its horn arm laterally.

6. A talking machine, comprising a plurality of record disk supports, means for rotating said supports, a laterally movable horn arm, a member hinged thereto, a reproducer carried by the hinged member, an arm carried by said hinged member, a weight carried by said arm, a plurality of spaced lugs coöperable with said weight to cause the raising and lowering of the reproducer, and means for moving the reproducer and its horn arm laterally.

7. A talking machine, comprising a plurality of supports arranged to receive overlapping record disks, means for rotating each support, a laterally movable horn arm, a reproducer, a hinged member carrying the reproducer and connecting it with the horn arm, means for raising and lowering the reproducer, a pusher for moving the horn arm and reproducer laterally, and means for operating said pusher.

8. A talking machine, comprising a circular series of record disk supports arranged to receive a circular series of record disks, a horn arm, a member hinged thereto, a reproducer carried by the hinged member, an arm on the hinged member, a weight carried by said arm, a stationary ring, a circular series of beveled lugs with which said weight coöperates to cause the raising and lowering of the reproducer, and means for moving the horn arm and reproducer laterally.

9. A talking machine comprising a plurality of record disk supports, a laterally movable horn arm, a reproducer connected therewith, driving means for said supports, a pusher for moving said horn arm laterally, a traveling member with which said pusher is connected, and gearing between said driving means and traveling member for operating the latter to move the pusher.

10. A talking machine, comprising a plurality of record disk supports, a laterally movable horn arm, a reproducer carried by said horn arm, driving means for said supports, a traveling member, a pusher for the horn arm adjustable to different positions

on said traveling member, and gearing between said driving means and traveling member for operating the latter to move said pusher.

11. A talking machine comprising a plurality of record disk supports, a laterally movable horn arm, a reproducer carried by said horn arm, driving means for said supports, a traveling member having a plurality of recesses, a pusher for the horn arm adapted to enter any one of said recesses, a spring arm carrying said pusher and secured to a part movable with the horn arm, and gearing between said driving means and traveling member for operating the latter to move said pusher.

12. A talking machine, comprising a circular series of record disk supports, a laterally movable horn arm movable over record disks on said supports, a reproducer carried by said horn arm, driving means for said disk supports, a horizontal gear wheel, a pusher for the horn arm movable by said gear wheel, a vertical shaft, a pinion carried by said shaft and meshing with said gear wheel, a worm wheel carried by said vertical shaft, a horizontal shaft, a worm carried by the horizontal shaft and meshing with said worm wheel, a worm wheel carried by the horizontal shaft, and a worm on the driving means and meshing with said last-mentioned worm wheel.

13. In a talking machine, the combination with framework, of a circular series of upright laterally movable shafts, disk carrying platforms at the upper ends of said shafts, wheels at the lower ends of said shafts, a central driving wheel, a horn tube arranged axially with respect to the driving wheel, a horn arm movable with said horn tube, a reproducer carried by said horn arm, means for moving said horn tube and horn arm progressively, a plurality of pivoted levers corresponding in number with the number of upright shafts, means connecting one arm of each of said levers with one of said upright shafts, and an arm carried by and movable with the vertical horn tube and coöperable with said levers progressively to move the wheels at the lower ends of the upright shafts progressively into operative relation to the driving wheel.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

WILLIAM H. DAILY.

Witnesses:

W. A. SMITH,

JOHN W. MARTIN.

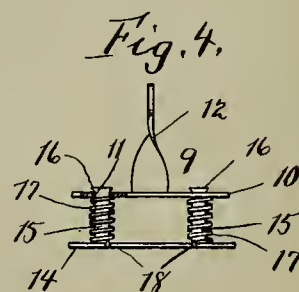
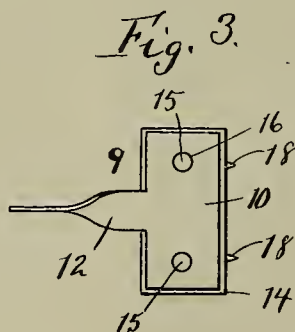
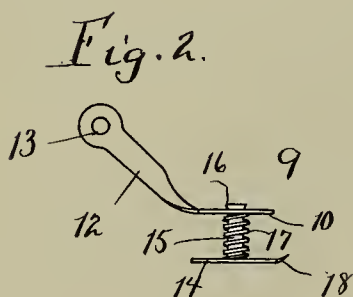
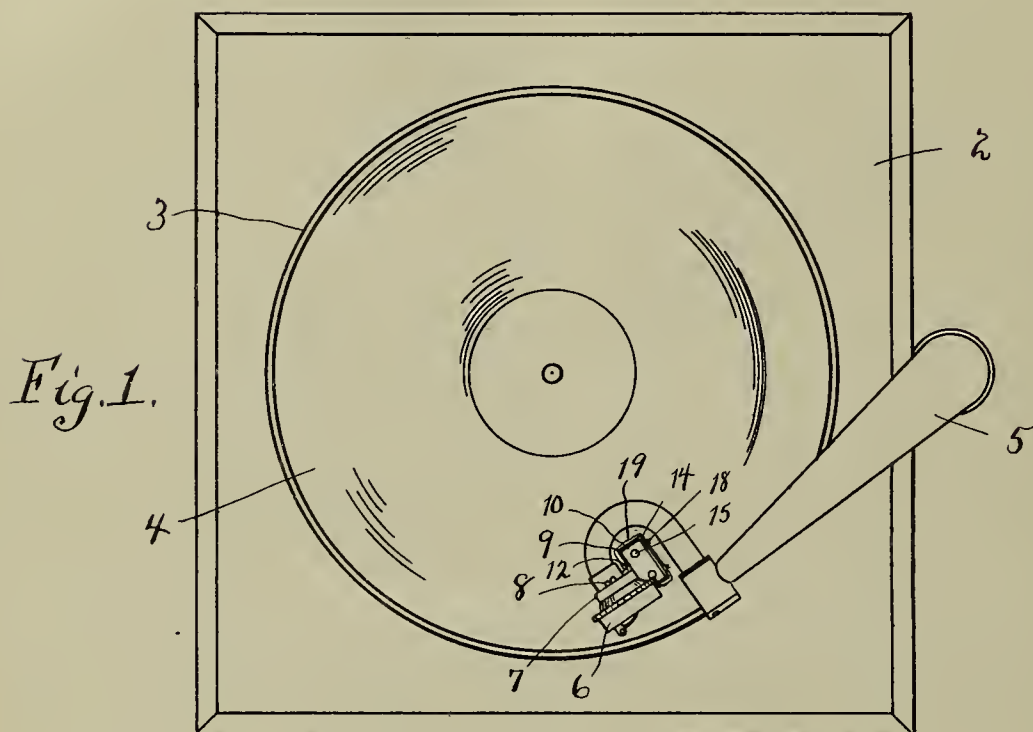
1,168,910

SOUND RECORD CLEANER,
1,168,910-----J. D. Rostron,
Patented-Jan 18, 1916.
Filed-June 16, 1915.

J. D. ROSTRON.
SOUND RECORD CLEANER.
APPLICATION FILED JUNE 16, 1915.

1,168,910.

Patented Jan. 18, 1916.



Witness
H. W. Burton

Inventor
James D. Rostron
By *W. H. Williamson*
Attorneys

UNITED STATES PATENT OFFICE.

JAMES D. ROSTRON, OF GERMANTOWN, PENNSYLVANIA.

SOUND-RECORD CLEANER.

1,168,910.

Specification of Letters Patent.

Patented Jan. 18, 1916.

Application filed June 16, 1915. Serial No. 34,353.

To all whom it may concern:

Be it known that I, JAMES D. ROSTRON, a citizen of the United States, residing at Germantown, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Sound-Record Cleaners, of which the following is a specification.

My invention relates to new and useful improvements in sound record cleaners, and has for its object to provide an exceedingly simple and effective device of this character which will resiliently hold a cleaning cloth or other suitable cleaning element upon the playing face of the sound record, so that the same will be wiped clean just previous to that part which is clean passing beneath the needle, the device being carried by the movable portion of the reproducing machine, whereby the cleaning cloth is carried over the sound record.

A further object of the invention is to provide an attachment for talking machines adapted to be fastened to some suitable portion thereof such as the sound box for the purpose of cleaning the sound records as the machine is played, thereby insuring a better tone to the music as well as prolonging the life of the record.

A still further object of the invention is to provide an attachment for talking machines, a portion of which is normally forced toward the sound record, while the latter is being played, thereby keeping a cleaning cloth in resilient contact with the record, so that said cleaning cloth will pulsate with the record, if any portion of the machine or said record is not level, thereby preventing any injury to the record.

With these ends in view, my invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, I will describe its construction in detail, referring by numerals to the accompanying drawing forming a part of this application, in which—

Figure 1 is a plan view of a talking machine, showing my improved sound record cleaner attached thereto. Fig. 2, is an enlarged side elevation of the sound record

cleaner. Fig. 3, is a plan view thereof; and Fig. 4, is a front elevation thereof, a portion of the top plate being broken away.

In carrying out my invention as here embodied 2 represents a talking machine of any suitable and well known construction provided with a turn table 3 on which the sound record 4 is placed, and over which moves the sound conveying arm 5 having a sound box 6 attached thereto by means of the rubber back 7, the latter being fastened by screws 8 to the sound box and to the sound conveying arm by the ordinary and well known bayonet slot and pin.

9 denotes my improved sound record cleaner or attachment, comprising a top plate 10 having an opening 11 therein adjacent each end and provided with an integral arm 12 projecting outwardly and upwardly from one edge thereof intermediate the ends, and this arm is twisted or formed with a spiral, so that the outer or free end thereof is at right angles to the inner end thereof, and said outer end is provided with a screw receiving opening 13, whereby the device is attached to some suitable portion of the talking machine such as the sound box thereof by means of one of the screws 8 passing through the screw receiving opening 13 in the arm 12, the rubber back 7, and threaded into the sound box. A bottom plate 14 is attached to the upper plate 10 by means of posts 15 which pass through the openings 11 in the top plate and are slidably mounted therein, the ends of said posts being headed as at 16 to prevent their accidental withdrawal from the top plate.

The bottom plate 14 lies parallel with the top plate, and is normally forced away from the latter by spiral springs 17 coiled about the posts 15 and resting between the two plates. The bottom plate 14 carries a pair of prongs 18 which are preferably formed integral with one edge thereof and project upwardly and outwardly, the upward projection of said prongs preventing the points thereof from coming in contact with the sound record.

A cleaning cloth 19 is secured to the bottom plate by means of the prongs 18, and when in use said cleaning cloth underlies the bottom plate 14 and rests upon the playing face of the sound record, so that as said sound record revolves beneath the cleaning cloth, the latter will wipe the record and

take up the dust or other foreign matter on the record just previous to that portion being cleaned passing beneath the needle.

In practice the cleaning cloth 19 will be held in resilient or light contact with the playing face of the sound record by means of the springs 17 which normally force the bottom plate 14 carrying the cleaning cloth away from the top plate 10, which is held in a rigid position with relation to some suitable portion of the talking machine, such as the sound box by means of the arm 12, and the tension of said springs is only such as will hold the cleaning cloth 19 in light contact with the playing face of the sound record, so that the speed of the latter will not be diminished, and so that said cleaning cloth will pulsate or move up and down with the irregularities of the record or the turn table on which said record is placed.

When the talking machine is not being played or when it is desired to place a record upon the turn table, those parts which reproduce or convey the sound from the record are moved away from said record, and as the attachment is secured to some one of these movable parts, said attachment will also be moved away from the record or the turn table to permit the removal from or the placing of a record on the turn table.

Of course I do not wish to be limited to the exact details of construction as herein shown, as these may be varied within the limits of the appended claims without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and useful, is—

1. A sound record cleaner comprising two parallel plates attached together and one of which is movable with relation to the other, means carried by one of said plates for attaching the device to some suitable portion of the talking machine, and means carried by the other plate for attaching a cleaning cloth thereto.

2. A sound record cleaner comprising a plate provided with attaching means, another plate provided with means for fastening a cleaning cloth thereto, and means for movably attaching said second plate to the first named plate.

3. A sound record cleaner comprising a plate provided with attaching means, another plate provided with means for fastening a cleaning cloth thereto, means for movably attaching said second plate to the first named plate, and means for normally forcing said last named plate from the first named plate.

4. A sound record cleaner comprising a

top plate having holes therein, attaching means carried thereby, a bottom plate provided with prongs, means carried by said bottom plate and slidably mounted in the holes in the top plate, and resilient means for forcing said bottom plate from the top plate.

5. A sound record cleaner comprising a top plate having holes therein, an attaching arm formed integral with one edge of said plate intermediate its ends and projecting outwardly and upwardly therefrom, said arm having a spiral therein and provided with a screw receiving opening at its outer end, a bottom plate provided with prongs and having means slidably mounted in the holes in the top plate, whereby said bottom plate is attached to said top plate and resilient means for normally forcing the bottom plate from the top plate.

6. A sound record cleaner comprising a top plate having holes therein, an attaching arm formed integral with one edge of said plate intermediate its ends and projecting outwardly and upwardly therefrom, said arm having a spiral therein and provided with a screw receiving opening at its outer end, a bottom plate, prongs carried thereby projecting outwardly and upwardly from one edge thereof, posts carried by said bottom plate and slidably mounted in the top plate, the ends of said posts being headed to prevent their accidental withdrawal from the top plate, and spring means for forcing the bottom plate from the top plate.

7. A sound record cleaner comprising a top plate having holes therein, an attaching arm formed integral with one edge of said plate intermediate its ends and projecting outwardly and upwardly therefrom, said arm having a spiral therein and provided with a screw receiving opening at its outer end, a bottom plate, prongs carried thereby projecting outwardly and upwardly from one edge thereof, posts carried by said bottom plate and slidably mounted in the top plate, the ends of said posts being headed to prevent their accidental withdrawal from the top plate, and springs, one of which is coiled about each of the posts lying between the plates for normally forcing the bottom plate from the top plate.

In testimony whereof, I have hereunto affixed my signature in the presence of two subscribing witnesses.

JAMES D. ROSTRON.

Witnesses:

JESSIE A. ROSTRON,
EDWARD M. BEMIS.

TELEGRAPHONE,

1,168,432-----F. Seelau,

Patented-January 18th, 1916.

Filed-May 28th, 1914.

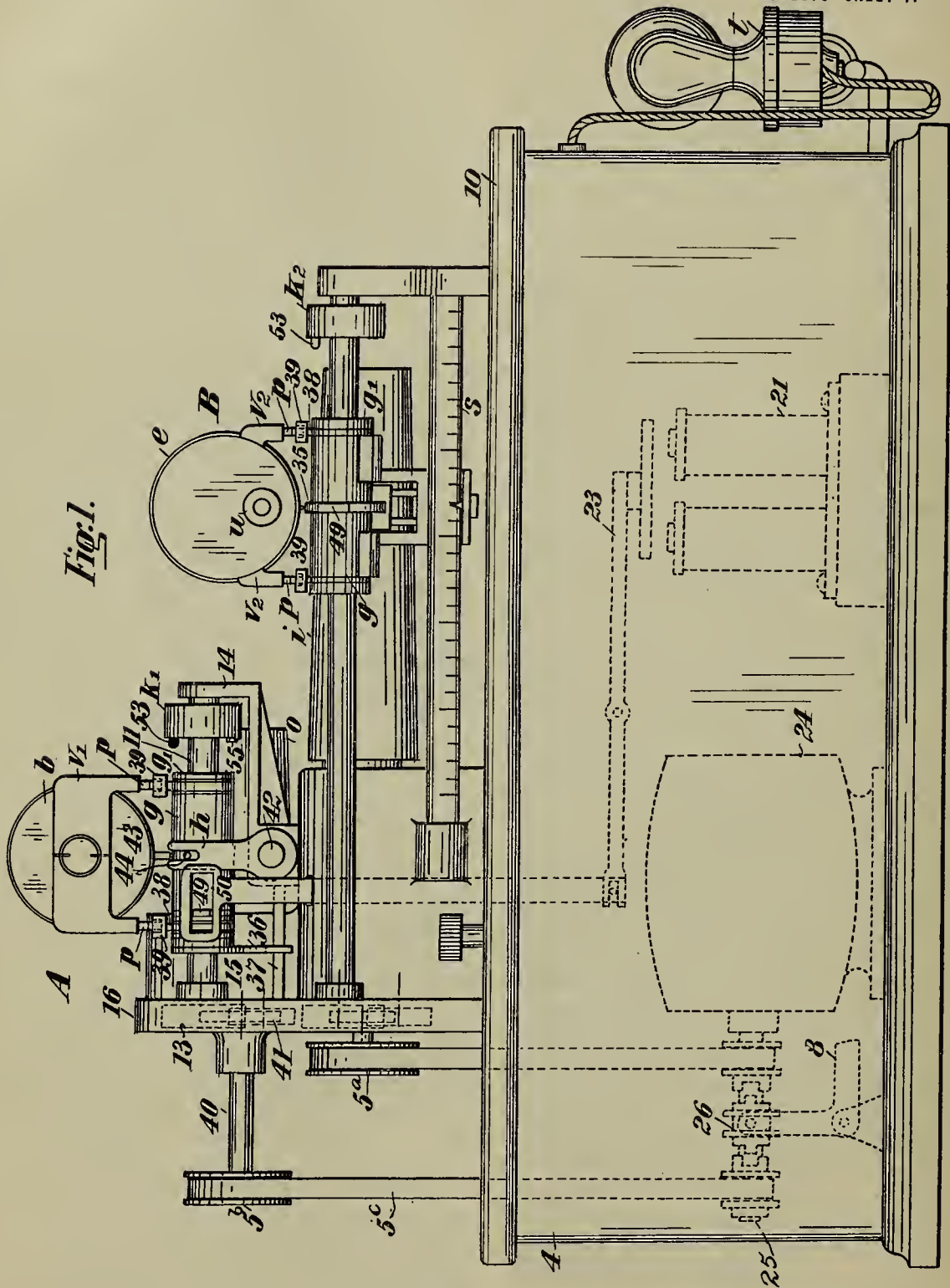
F. SEELAU.
TELEGRAPHONE.

APPLICATION FILED MAY 28, 1914.

1,168,432.

Patented Jan. 18, 1916.

4 SHEETS—SHEET 1.



Inventor:
F. Seelau
by *Biesen & Zump*
Att'y.



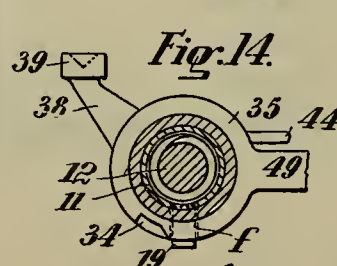
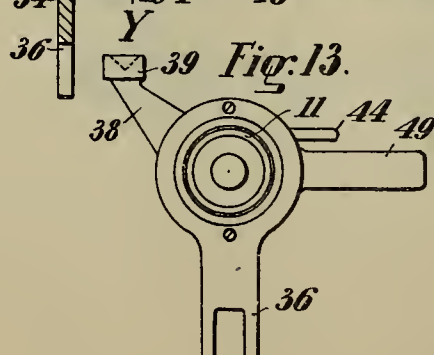
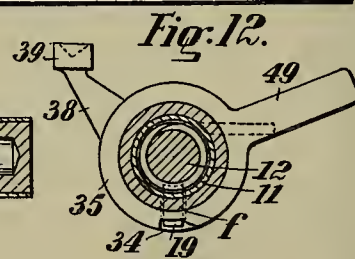
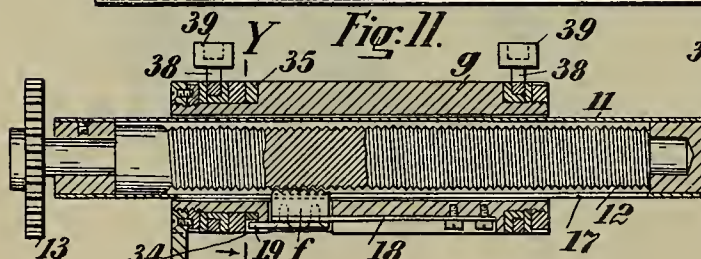
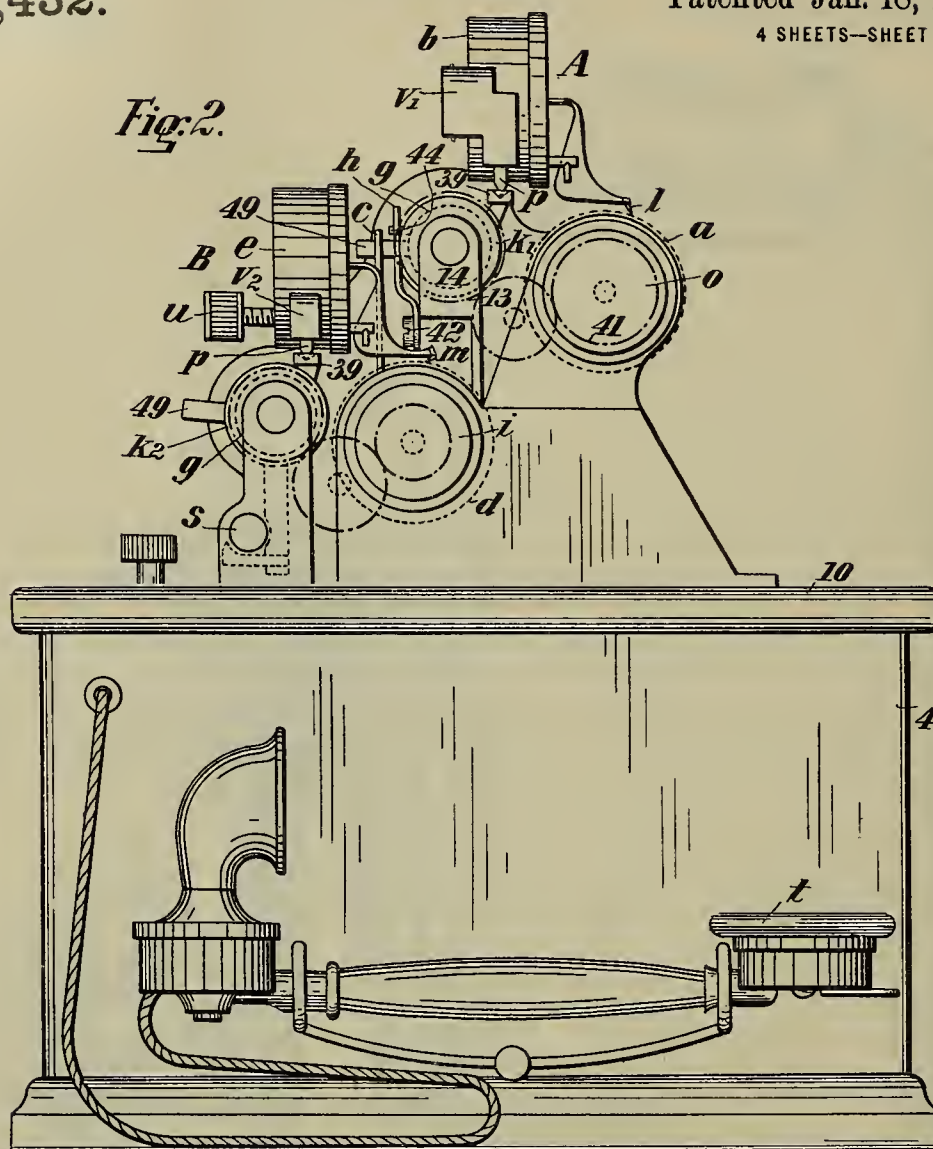
1,168,432.

F. SEELAU.
TELEGRAPHONE.

APPLICATION FILED MAY 28, 1914.

Patented Jan. 18, 1916.

4 SHEETS—SHEET 2.

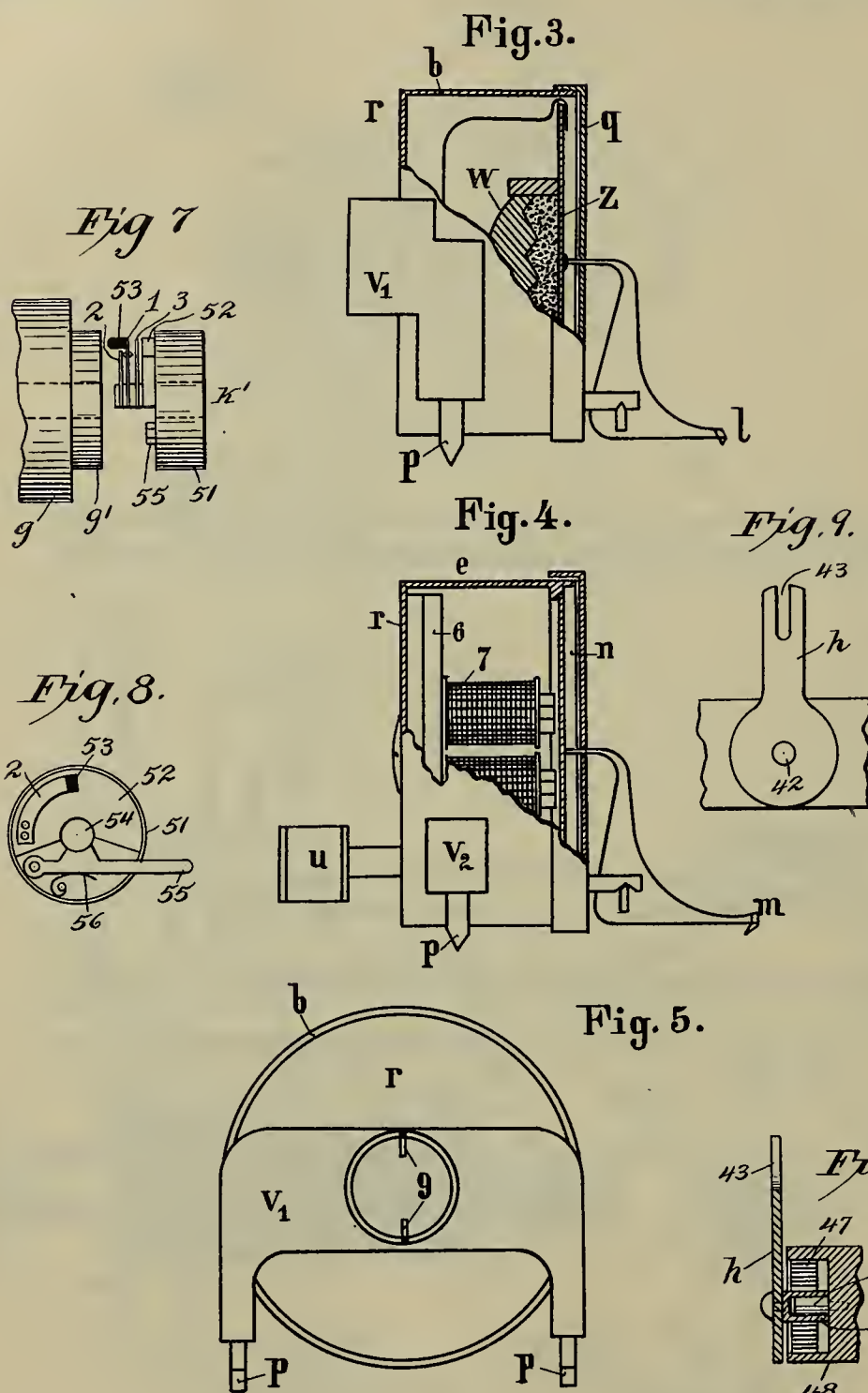


Inventor:
Frang Seelan
by Priesen & Zumpfe Att'ys

1,168,432.

F. SEELAU.
TELEPHONE.
APPLICATION FILED MAY 28, 1914.

Patented Jan. 18, 1916.
4 SHEETS—SHEET 3.



Witnesses

Emilie Rahm
Madeline Hirsch

Inventor

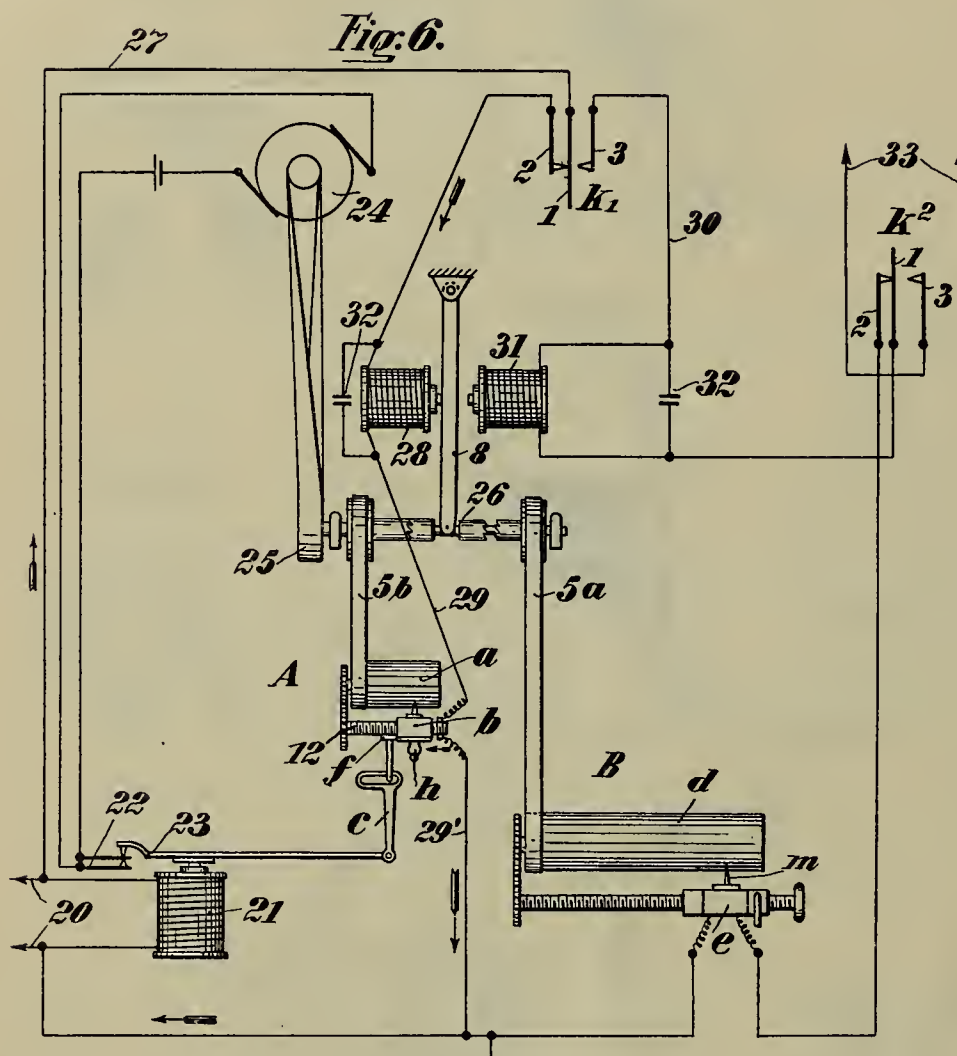
Franz Seelau
by his attorneys
Brisson & Zumpfe

1,168,432.

F. SEELAU.
TELEPHONE.
APPLICATION FILED MAY 28, 1914.

Patented Jan. 18, 1916.

4 SHEETS—SHEET 4.



Inventor
F. Seelau
By Priesner & Zumpfer

UNITED STATES PATENT OFFICE.

FRANZ SEELAU, OF BERLIN-WILMERSDORF, GERMANY, ASSIGNOR OF ONE-HALF TO
ALEXANDER M. NEWMAN, OF BERLIN-WANNSEE, GERMANY.

TELEGRAPHONE.

1,168,432.

Specification of Letters Patent.

Patented Jan. 18, 1916.

Application filed May 28, 1914. Serial No. 841,408.

To all whom it may concern:

Be it known that I, FRANZ SEELAU, a subject of the German Emperor, residing at Berlin-Wilmersdorf, Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Telegraphones, of which the following is a specification.

The present invention relates to a device for phonographically recording conversations transmitted by telephone. Such device is generally called a telegraphone. This is a device, which is intended to be connected to a telephone line and which will be set in operation when a call arrives over the telephone line. In such case a so-called responding device informs the calling party that the called subscriber is absent, but that his message will be recorded by the device. Thereupon the responding device is put out of operation and the recording device is started whereupon the message of the caller is recorded on a phonographic roll.

The present invention consists in various combinations and designs, by which the said device is improved and its operation is considerably simplified. A considerable improvement resides therein that after the answer has been given to the caller the switching for the recording operation is performed quite automatically and without any aid of the caller, the responding device being, at the same time, automatically put out of operation. A further improvement consists in that the sound boxes, of which the one serves for responding, the other for recording, are readily interchangeable, so as to allow of listening to the message recorded or of recording any desired answer on the responding roll.

All novel features are disclosed in the following specification and description of the device and are specified in the claims. Reference is therewith had to the accompanying drawings.

In these drawings Figure 1 is a front elevation of the whole device. Fig. 2 is a side elevation. Fig. 3 is a side elevation of the responding sound box, a part of the wall being removed to show the interior. Fig. 5 is a rear view of the same. Fig. 4 is the recording sound box, partly in elevation, partly in inside view. Fig. 6 is a diagrammatical illustration of the device with the

required circuits. Figs. 7-14 show details, the object of which will be evident from the specification.

From Figs. 1 and 2 it will be seen that the device is mounted on a box base 4 in which the mechanical driving device, *e. g.* an electric motor 24, may be placed. This motor is coupled by the aid of a two-position coupling 26 to one of the driving pulleys 5^a or 5^b and thus sets the cylinder drum *i* or *o* in motion. The box base 4 furthermore contains various electromagnets required for the operation of the device of which magnets, for the sake of greater clearness only one magnet 21 is indicated. On the top plate 10 in Fig. 1, the responding device A is shown on the left and the recorder B on the right. A phonographic cylinder *a* of the responding device may be fitted on to the drum *o* while the drum *i* carries the cylinder record *d* of the recording device. The other parts of the responding device are mounted near the responding cylinder *a*, and comprise a slide or carriage *g* supporting the responding sound box *b*, which consists principally of a phonograph sound box combined with a microphone. The carriage *g* is shifted in the manner usual in phonographs by a feed-nut *f* which engages with a screw spindle. The mechanism is more fully shown in Figs. 11 to 14 and consists of a sleeve which is slidably fitted on a tube 11. In this tube is provided a screw spindle 12 having a fine thread, which screw spindle is turned by means of the toothed wheel 13. The tube 11 which is secured with its one end in the bracket 14, and with its other end at 15 in the wall 16, Fig. 1, has on its underside a longitudinal slot 17, through which a nut-like member *f* secured to the slide *g* projects. When this nut-member engages with the screw spindle 12, the slide will by means of the revolving spindle 12 be gradually displaced to the right, so that the needle of a sound box placed on the slide will follow the fine record grooves on the record roll *o*. The nut-member *f* is secured by means of a spring 18 to the slide *g* so that it will be pressed into the thread of the screw spindle 12 when its nose 19 engages in a notch in a ring 35, which is fitted concentrically to the slide sleeve *g* in such a manner, that it can be turned relatively thereto. The one

edge of the notch 34 is slightly beveled, so that the nose 19 will, on the ring 35 being adjusted, be lifted from the notch 34, whereby the engagement of the nut-member *f* with the screw spindle 12 is disconnected. These two positions of the ring 35 and the nut-member *f* are illustrated in Figs. 12 and 14, both being sectional views on the line Y—Y in Fig. 11. For securing the position of slide *g* a fork 36 is provided, which engages over a guide rod 37 disposed parallel to the sleeve slide *g*. To the latter are also fitted two brackets 38, each of which carries a pan for a knife edge, on which the sound box *b* is supported. The brackets 38 are secured to the sliding sleeve *g* by interposed insulating pieces, so that there is no electrically conductive connection between the brackets 38 and the bearing pan 39 with the sleeve *g* or any other metallic parts.

The shaft 40 of the drum *o*, which is disposed parallel to the guide of the slide *g* carries the pulley 5^b over which runs a belt 5^c which leads to the reversible coupling 26. The shaft 40 drives by means of a toothed wheel 41 on wheel 15 of the screw spindle 12 so that, when the pulley 5^b is driven, both the drum *o* and the screw spindle 12 will be rotated, whereby, by the coaction of the screw spindle 12 and of the nut-member *f* the slide *g* will be slowly advanced to the right. During its travel the slide carries with it a so-called torque lever *h* which engages with its fork 43 over a pin 44 in slide *g*. The torque lever *h* which is shown separate in Figs. 9 and 10, is pivoted at 42 in the bracket of the slide. On a bearing pin 45 is fitted a sleeve 46 which is attached to the lever *h*. On sleeve 46 is fitted a spiral spring 47 which is secured at its inner end to the sleeve 46, and at its outer end to the wall of its casing 48. When lever 44 is moved to the right by the travel of the slide *g*, the spring 47 will be tightened. When then the coupling of the nut-member *f* with the screw-spindle 12 is disengaged, the slide will, in consequence of the spring action 47 and by coaction of lever *h* and pin 44 be again returned to the left into its initial position. The turning of ring 35 in order to engage or disengage, respectively, the nut *f* with or from the screw spindle 12 is effected by a shoulder 49 engaging in the fork 50 of an intermediate lever *c*, which is operated by means of an electric magnet in the manner hereinafter described.

The hereinbefore mentioned reversible coupling 26 can, in its second position, couple the driving motor 8 with a belt pulley 5^a which drives the drum *i* of the recorder B. The recorder B consists, the same as the responder A of a drum *i*, on which a phonograph record roll *d* is placed, and a slide or carriage *g* as carrier for the sound box. This carriage *g* is essentially

of the same construction as slide or carriage *g* of the responder A and also its guide and the mechanism for moving it sidewise is the same; only here the electromagnetic disengagement of the driving spindle 12 and of the lever *h* for returning the carriage automatically to its initial position is omitted. For returning the carriage *g* of the recorder B, together with its sound box *e* to its initial position on the left the shoulder 49 of ring 35 is here displaced by hand for disengaging the feed nut *f*. The lower guide rod *s* which corresponds to the guide rod 37 of the responder, is provided with a scale, in order to allow of measuring the length of the message recorded on the roll *d*, and furthermore serves as a slip contact for the hereinafter described terminal for conducting the current to the telephone part of the sound box *e*.

The sound box *b* of the responder A and the sound box *e* of the recorder B are, essentially, of the same design, being a combination of a telephone sound box, a transmitter or receiver with a phonographic sound box, in such a manner that with the responder sound box *b* behind the diaphragm of the phonographic sound box a transmitter chamber is provided, or, with other words, the diaphragm of the transmitter box is connected directly to the phonograph stile. In the recorder box *e* behind the diaphragm of the phonograph box proper a system of magnets is provided, such as used for telephone receivers, or, with other words, the diaphragm of the receiver box is directly coupled to a phonograph stile. Thus both sound boxes *b* and *e* consist, as evident from Figs. 3 and 4, of a casing *r*, into which a transmitter system or a receiver system, respectively, is fitted, the diaphragm *q* and *n*, respectively is connected to a phonograph stile *l* and *m*, respectively.

In the responding box *b* (Fig. 3) a carbon contact *w* is arranged at a given distance from the diaphragm *q*. The space between this stationary contact and the diaphragm, which is closed at the sides by a ring *y* of any suitable insulating material, is filled with carbon granules *z*. The phonograph stile or needle *l* attached to the diaphragm *q* is made of such a shape, that it can follow the fine record waves or grooves in a phonograph record roll, without injuring such record. For carrying this sound box *b* on its carriage *g* a piece of insulating material *v*₁ is attached to casing *r*, to which knife-edge projections *p* are fitted on either side of the sound box. The one of these projections is conductively connected with the carbon contact *w*, the other with the diaphragm *q*. These knife-edges *p* fit into the above mentioned pans 39 on carriage *g*. The electric connection between the micro-

phone and the telegraphone is, therefore, solely effected by the sound box *b* being fitted with its projections *p* into the pans 39 on carriage *g*, from which pans the current is conducted further without any other connections having to be made. In order to allow of a lateral movement of the sound box *b*, the casing *r* may be pivotally fitted to the insulating part *v*₁ by means of short pins 9, as shown in Fig. 5, being a rear view or Fig. 3.

In the casing *r* of the recorder box *e* (Fig. 4) a magnet system 6 is fitted in the usual manner, on the pole shoes of which magnet coils 7 are arranged. This magnet system is disposed in such a manner, that the pole shoes are behind the diaphragm *n*. This diaphragm *n* is, likewise, fitted with a phonograph stile *m* but this stile is of such a shape, that it can engrave record waves into the phonograph roll. This sound box *e* is likewise supported by means of knife-edges *p* fitted with insulating parts *v*₂ to the casing *r*; also here the knife edges *p* serve for closing the electric connection with the coils 7 of the telephone system, when the sound box *e* is placed in the manner described with sound box *b* into its carriage *g*. The regulating weight indicated at *u* has the object of regulating the pressure with which the recording stile *m* bears on the roll *d*, so as to secure the proper engraved depth of the record grooves.

The switching arrangements required for the automatic operation of the whole apparatus are marked in Fig. 1 with *k*₁ at the responder A for switching from responding to recording, and with *k*₂ at the recorder B for incidentally switching the record onto a further roll.

The arrangement of these switches is shown in side elevation in Fig. 7, and in front elevation in Fig. 8. Into a ring 51, made of metal, is fitted a body 52 of insulating material, to the front surface of which three contact springs 1, 2, 3 of a sickle shape are attached. In Fig. 7 the insulating body 52 has been drawn out from the ring 51, in order to show the contact springs. In its position of rest the contact spring 1 touches the contact spring 2. For switching the contact spring 1 from 2 to 3, the contact spring 1 is provided with a nose 53 of insulating material. The so constructed switch *k*₁ is fitted with its bore 54 in such a manner on tube 11, that the carriage *g* can abut with its right face *g*₁ against the nose 53 of contact spring 1, when the carriage travels to the right, and the answer recorded on roll *a* has been completely delivered. The switch *k*₁ is displaceable on tube 11, so as to allow of its being set in such a manner as may be required by the length of the message recorded on the roll *a* of the responder A. The switch *k*₁

is fixed by a lever 55, which is pressed by a spring 56 against tube 11. When lever 55 is pressed downward, the whole switch *k*₁ may be easily displaced on tube 11. The switch *k*₂ on the recorder B has been similarly constructed, only here no adjustability is required. The switch *k*₂ is placed in such position, that the front face *g*₁ of carriage *g* of the recorder B abuts against the nose 53, when the roll *d* has been completely covered with record grooves.

In explanation of the diagram, Fig. 6, the following may be said: The driving motor 24 drives a countershaft 25, from which by means of the reversible coupling 26 either the pulley 5^b or 5^a is driven. The coupling 26 is reversed by the electric magnets 28 or 31 acting on a lever 8. When the electric magnet 28 is excited, the coupling is engaged on the left, so that the driving motor 24 drives the belt pulley 5^b and the roll *a*, together with the carriage *g* of the responder A. When, on the other hand, the electric magnet 31 is excited, the coupling 26 is engaged on the right whereupon the roll *d* with the respective carriage of the recorder B is driven by the motor 24 and the belt drive 5^a.

20 are conductors which lead to the substation of the calling subscriber. They proceed from the electric magnet 21, which effects the switching of the whole arrangement; through contact 22, which is closed by the armature 23 of this magnet 21, the driving motor 24 is started. From conductor 20 is branched off a conductor 27 which leads to the middle spring 1 of switch *k*₁. This switch *k*₁ is, as hereinbefore said, in the path of the carriage of the responder A, has, however, for allowing of a greater simplicity, been indicated in Fig. 6 at another place. Spring 2 of the switch *k*₁ is connected to the winding of the electric magnet 28, from the other side of which the conductor 29 leads to the microphone of the responder sound box *b*, the passage of the current being enabled in the manner described by the bearings of the sound box *b*. The circuit for the responder box *b* is completed by the conductor 29' being connected to the second wire of the conductor 20. From spring 3 of switch *k*₁ a conductor 30 leads to the electric magnet 31, which on the other side is connected to spring 1 of the switch *k*₂. This switch *k*₂ is fitted in the manner described in the path of the carriage of the recorder B, but has, likewise, for greater clearness of the drawing, been drawn in a different position. The spring 2 of switch *k*₂ is likewise electrically connected with the telephone of the recorder box *e* by means of the bearings. The other side of the telephone is connected with the return wire of conductor 20. 33 are conductors which lead to another recording

box in the same manner as described, when a second record roll with a corresponding sound box is provided for recording long messages. The shaft and guide spindle of this second record roll and sound box are rotated by a drive which is a substantial duplicate of that described with relation to recorder B, so that a detailed drawing and description is deemed superfluous. The armature 23 of magnet 21 of the responder A is coupled to the aforementioned lever *c*, so that, when magnet 21 is excited, the lever *c* will effect the engagement of the feed-nut *f* into the feed screw 12 so as to produce in the responder A the travel of carriage *g* of the responder box *b*. As soon as the magnet 21 is dead, the lever *c* moves down and thereby the engagement of the feed-nut *f* is disconnected, whereupon the carriage is returned into its initial position by the spring action of the torque lever *h*, in the manner described.

For leading off the talking currents from the windings of magnets 28 and 31, which generally show self-induction, they are bridged by condensers 32.

The operation of the arrangement is as follows:—When a subscriber, who is connected to the conductor 20, wishes to communicate with the telegraphophone, he gives the call signal in the usual manner, by switching on his telephone and sending a current into the conductor 20. Thereby the magnet 21 is excited and attracts its armature 23. The contact 22 is closed and the motor 24 is started. At the same time the coupling of the carriage *g* of the responder A engages over the feed-nut *f* with the spindle 12 by the armature 23 reversing the lever *c*. As also the magnet 28 is excited via the conductors indicated by arrows in Fig. 6, it will, throw the coupling 26 to the left, whereupon the motor 24 drives the responder A. The microphone of the responder box *b* likewise receives current for its excitation via the conductor 27, springs 1, 2 from switch *k*₁, magnet 28, conductors 29 and 29'. This is illustrated in Fig. 6. Now the answer is given, by the answer recorded on the responder roll *a* being delivered by the sound box *b*: for example: "Mr. N. is not in, but your message will be recorded by the telegraphophone". After the message has been completely delivered, the edge *g*¹ of carriage *g* has reached the switch *k*₁ and the spring 1 is reversed. Thereby the magnet 28 and the sound box *b* become dead, and the magnet 31 is engaged. The latter when excited throws the coupling 26 to the right, so that now the recorder B is driven by the motor 24. The record is now made, by the talking currents coming from the calling subscriber proceeding over conductor 27, springs 1 and 3 of switch *k*₁, conductor 30, condenser 32, springs 1 and 2 of switch *k*₂ to the telephone

of the recorder box *e* and flowing through the windings of the pole pieces 7, Fig. 4. Thereby the diaphragm *n* is vibrated, and these vibrations are directly transmitted to the recording stile *m* and thereby engraved into the wax-roll beneath it. When the record has filled this roll, the switch *k*₂ is reversed in the same manner as described with reference to switch *k*₁ by the carriage abutting against switch *k*₂. The continuation of the message is then received by the second record roll, which with its corresponding sound box is disposed in a similar manner as the parts of the recorder B shown.

When the conversation is completed, the calling subscriber switches his telephone off again, whereby the current flowing through the conductor 20 is broken. Thereby the excitation of magnet 21 ceases and the whole arrangement is stopped in the following manner:—The armature 23 of the magnet 21 interrupts at the contact 22 the driving current for the motor 24. At the same time it reverses the lever *c*, whereupon the feed-nut *f* disengages the carriage, so that the carriage *g* will be returned by the spring action of lever *h*. Also the magnet 31 is de-energized, whereby the coupling 26 is also reversed. The recording box *e*, however, remains in its position in which the record was completed, so that when the next message arrives, after the response has been given to the next call in the manner described, the record will be continued from this part of the record roll *d*.

For listening to the message which has been recorded on the roll *d*, the sound box *e* of the recorder B must be removed from its carriage and the sound box *b* of the responder A be set to the beginning of roll *d*, and the receiver and transmitter hand combination or telephone *t* must be switched to the conductor 20, for which purpose a double-throw switch may be provided. As the knife-edge bearings *p* of the sound boxes are at the same time current contacts for the receiver and the transmitter system, no other connections are required after their exchange. When now the transmitter of *t* is switched on the apparatus will be started in the same manner as described when the other subscriber called. After the switch *k*₁ has been thrown over, the roll *d* commences to revolve and delivers the message through the microphone switched on from *b* into the telephone of the hand apparatus *t*.

For producing a record on a responder roll *a*, the recording box *e* is substituted for the box *b* over roll *a*, and the answer is then spoken into the microphone of the apparatus *t*. When the message, which is to serve as response, is completed the switch *k*₁ is moved up close to the carriage *g* and fixed in such position by lever 55. By such adjustment it is obtained, that immediately after the re-

sponse has been given, the throw-over for the recording proceeds in the manner described.

It is obvious that details of the designs and arrangements of the various parts of the device may be modified without departing from the principle of the invention. So, for example, the roll drums may be driven by gear wheels in place of belts.

I claim:—

1. A device for recording messages transmitted by telephone comprising a responding roll with response impressions imprinted thereon, a responding sound box coacting with the response impressions on said responding roll, recording rolls, a recording sound box for making message impressions on each said recording roll, a calling telephone line, a connection between the responding sound box and the calling telephone line, switching devices controlled by the responding sound box and the recording sound box, means actuated by the switching device for starting the operation of a recording roll immediately the responding sound box reaches the end of the response impressions and for connecting the calling telephone line to a recording sound box, and means for starting the operation of another recording roll and its coacting recording sound box immediately the one recording roll is covered with sound impressions.

2. A device for recording messages transmitted by telephone comprising a responding roll with response impressions imprinted thereon, a responding sound box coacting with the impressions on said responding roll, recording rolls, a recording sound box for making message impressions on each said recording roll, a calling telephone line, a connection between the responding sound box and the calling telephone line, a switching device controlled by the responding sound box and adjustably mounted so that it may be fixed at different points of recording cylinder according to the length of the response impressions, means actuated by the adjustable switching device for starting the operation of a recording roll immediately the responding sound box reaches the end of the response impressions and for connecting the calling telephone line to the recording sound box.

3. A device for recording messages transmitted by telephone comprising a responding roll with response impressions imprinted thereon, a responding sound box coacting with the impressions on the said responding roll, a feed device for moving said responding sound box, recording rolls, a recording sound box for making message impressions on each said recording roll, a calling telephone line, a connection between the responding sound box and the calling telephone line, a switching device controlled by

the responding sound box and the recording sound box, starting means actuated by the switching device for starting the operation of the recording roll immediately the responding sound box reaches the end of the responding impressions and for connecting the calling telephone line to the recording sound box, a feed device for moving the recording sound box along the recording roll while a message is being delivered through the calling line, means for restoring the response sound box to its initial position at the end of a message while leaving the recording sound box in its advanced position where it starts a new record on the transmission of the next message.

4. A device for recording messages transmitted by telephone comprising a responding roll with response impressions imprinted thereon, a responding sound box coacting with the impressions on the said responding roll, a recording roll, a recording sound box for making message impressions on said recording roll, a mounting for said recording sound box, a calling telephone line, a connection between the responding sound box and the calling telephone line, a switching device controlled by the responding sound box and the recording sound box, means actuated by the switching device for starting the operation of the recording roll, immediately the responding sound box reaches the end of the response impressions and for connecting the calling telephone line to the recording sound box, a listening telephone and means for connecting the listening telephone to the said responding sound box.

5. A device for recording messages transmitted by telephone comprising a responding roll with response impressions imprinted thereon, a responding sound box having a diaphragm acting directly on microphonic contacts and bearing a phonographic stile that coacts with the impressions on the said responding roll, a recording roll, a recording sound box for making message impressions on said recording roll, a calling telephone line, a connection between the responding sound box and the calling telephone line, a switching device controlled by the responding sound box and the recording sound box, means actuated by the switching device for starting the operation of a recording roll immediately the responding sound box reaches the end of the response impressions and for connecting the calling telephone line to the recording sound box.

6. A device for recording messages transmitted by telephone comprising a responding roll with response impressions imprinted thereon, a responding sound box coacting with the impressions on said responding roll, an electromagnetic telephone receiver, a recording roll, a recording sound box hav-

ing a diaphragm that is directly under the magnetic influence of the electromagnetic receiver and bearing a phonographic stile for making message impressions on said recording roll, a calling telephone line, a connection between the responding sound box and the calling telephone line, a switching device controlled by the responding sound box and the recording sound box, means actuated by the switching device for starting the operation of a recording roll immediately the responding sound box reaches the end of the response impressions and for connecting the calling telephone line to the recording sound box.

7. A device for recording messages transmitted by telephone comprising a responding roll with response impressions imprinted thereon, a responding sound box comprising a microphone and a stile coacting with the impressions on the said responding roll, a recording roll, a recording sound box for making message impressions on said recording roll, a mounting for the said responding sound box comprising a plurality of supporting electricity conducting surfaces, an insulating piece on the responding sound box, two metallic knife edge supports attached to the insulating piece and arranged so as to contact with said supporting surfaces, electrical connections between the knife edge supports and the microphone, a calling telephone line, a connection between the said supporting surfaces and the calling telephone line, a switching device controlled by the responding sound box and the recording sound box, means actuated by the switching device for starting the operation of a recording roll immediately the responding sound box reaches the end of the response impressions and for connecting the

calling telephone line to the recording sound box.

8. A device for recording messages transmitted by telephone comprising a responding roll with response impressions imprinted thereon, a responding sound box coacting with the impressions on said responding roll, a recording roll, a recording sound box comprising a telephonic receiver and a stile for making message impressions on said recording roll, a mounting for the said recording sound box consisting of a plurality of insulated electricity conducting supporting surfaces, a calling telephone line, an insulating piece on the said recording sound box, two metallic knife edge supports attached to the insulating piece, each knife edge support resting on a supporting surface, electrical connections with the supporting surfaces that extend toward the calling telephone line, electrical connections between the knife edge supports and the telephone receiver, a connection between the responding sound box and the calling telephone line, a switching device controlled by the responding sound box and the recording sound box, means actuated by the switching device for starting the operation of the recording roll immediately the responding sound box has reached the end of the response impressions and for completing the said electrical connections with the calling telephone line to the recording sound box while disconnecting the responding sound box.

In testimony whereof I affix my signature in presence of two witnesses.

FRANZ SEELAU.

Witnesses:

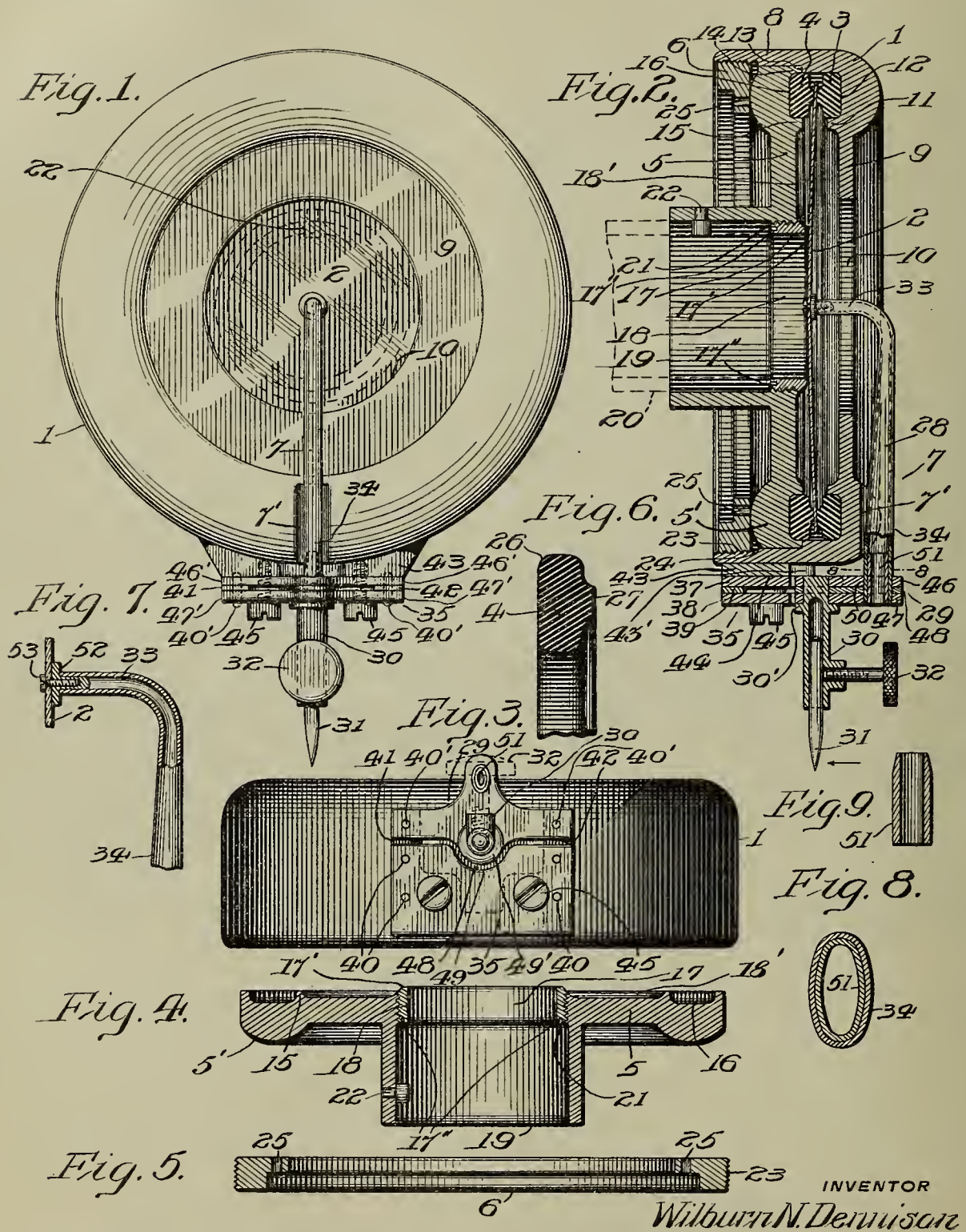
WOLDEMAR HAUPT,
HENRY HASPER.

SOUND BOX FOR TALKING MACHINES,
1,169,134-----W. N. Dennison,
Patented-January 25h, 1916.
Filed-May 27th, 1909.

W. N. DENNISON.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED MAY 27, 1909.

1,169,134.

Patented Jan. 25, 1916.



WITNESSES
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BY

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Home Pet.

ATTORNEY

UNITED STATES PATENT OFFICE.

WILBURN N. DENNISON, OF MERCHANTVILLE, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

1,169,134.

Specification of Letters Patent.

Patented Jan. 25, 1916.

Application filed May 27, 1909. Serial No. 498,697.

To all whom it may concern:

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of the borough of Merchantville, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

10 This invention relates to improvements in sound boxes for talking machines; and the objects of this invention are, to provide an improved sound box casing, to provide an improved mounting for a diaphragm; to
15 provide an improved stylus bar and mounting therefor; to provide improved means for conducting sound waves from a sound box; to provide adjustable means cooperating with the diaphragm to partially trap and
20 compress a portion of the air in the sound box to improve the reproduction of sound therefrom; to provide a sound box in which the diaphragm will be normally held flexed by an initial pressure when not in operation
25 to counterbalance the pressure which is ordinarily exerted on the diaphragm by the lateral pressure on the stylus due to the propelling action of the record upon one side of the stylus, in carrying the sound box
30 across the face of the record; to make it possible to assemble commercially large numbers of sound boxes with diaphragms held between gaskets with substantially the same pressure; and to provide other im-
35 provements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a front elevation of a sound box constructed in accordance with this invention; Fig. 2 a longitudinal vertical section of the same; 40 Fig. 3 a bottom plan view of the same with a part shown in dotted lines for clearness; Figs. 4 and 5 are longitudinal sectional views of details of the same; Fig. 6 is a fragmentary transverse section of a detail of the
45 same; Fig. 7 a fragmentary side elevation partly in section of a portion of the same; Fig. 8 a horizontal section on line 8, 8 of Fig. 2; and Fig. 9 an enlarged longitudinal section of a portion of the same.

50 Referring to the drawings, one embodiment of this invention comprises an outer casing 1, a diaphragm 2, gaskets 3 and 4 for holding the diaphragm in position, an annular back plate 5 which is provided with

means for securing a gasket in place, and 55 also with means for connecting the sound box to the usual sound conducting tube, a locking ring 6 for retaining the back plate in position in the outer casing, and a stylus bar 7 mounted to oscillate upon the casing, 60 the front of the casing being recessed as at 7' to permit of the free oscillation of the bar.

The locking ring 6 has a substantially flat inner surface, and the back plate 5 differs 65 from the ordinary construction in that it is provided upon its outer face with a circular marginal rib 5' curved in cross section and having a convex outer side against which the flat inner surface of the locking ring 6 70 engages throughout only a very narrow region which is practically only a circular line. This construction makes it easy in practice to insure a substantially uniform pressure of the locking ring against the back plate 5 75 without having to provide carefully fitted cooperating surfaces between the ring and the back plate and affords a simple arrangement whereby the seating of the back plate in the outer casing 1 may be effected with 80 certainty.

The outer casing 1 of the sound box comprises a substantially cylindrical rim portion 8, having an inwardly extending flange 9, integral therewith upon the front side 85 thereof, forming a circular front wall having a centrally arranged opening 10. On the interior face of the wall 9, and spaced from the internal periphery of the outer casing is an annular rib or projection 11 concentric with the wall 9. This rib forms with the internal surface of the rim 8 and the internal surface of the front wall of the casing, an annular groove 12, substantially rectangular in cross section but with rounded 95 bottom corners, the walls of which form a seat for the outer gasket 3.

The rim 8 of the casing is counterbored from its rear end forming a cylindrical recess coaxial therewith to receive the back 100 plate 5, and forming a rearwardly facing annular stop shoulder 13 to limit the inward movement of the back plate. The back plate 5 forms the rear wall of the sound box casing and is substantially parallel to and coaxial with the front wall 9 of the casing. 105

The back plate 5 is preferably made of the same material as the outer casing and is pro-

vided at its periphery with an inwardly projecting cylindrical flange 14, which abuts against the internal stop shoulder 13 of the rim 8 and limits the inward movement of the back plate. This back plate is also provided with an annular rib or projection 15 on its inner face similar to and coaxial with the annular rib 11, upon the inner face of the front wall 9. These annular projections 14 and 15 upon the inner surface of the back plate form in connection with the inclosed surface of the back plate an annular groove 16 similar in shape and equal in size to the opposite groove 12, and the walls of which form a seat for the inner gasket 4.

For increasing the efficiency of the sound box the back plate is provided with a rib projecting inwardly toward the diaphragm, and may be formed as a cylindrical annular bushing 17 of metal or other suitable material threaded into or otherwise adjustably secured in the centrally disposed circular opening 18 of the back plate, the inner portion of the bushing projecting inwardly from the adjacent internal surface of the back plate and forms a rib or projection 17' terminating in very close proximity to the diaphragm, the space between the end of the said rib 17' and the diaphragm being substantially as small as is practical without causing actual contact between the said rib and the diaphragm when the sound box is in operation. The bushing is provided in its outer end with apertures 17'' adapted to receive a spanner wrench whereby the bushing 17 may be adjusted toward or away from the diaphragm. If preferred this bushing 17 and the annular projection 17' may be made integral with the back plate, and in any case forms a continuous projection bordering or surrounding the opening in the back plate and the internal or cylindrical surface of the bushing 17 forms the internal wall of the inner end of the sound conducting opening 18 of the sound box casing. This construction of the back plate and bushing leaves an annular recess or chamber 18' in the inner rear face of the casing concentric with the outlet so that the passage of air or sound waves into the outlet or passage from the interior portion of the casing surrounding the outlet and in the rear of the diaphragm, is restricted by the inwardly extending bushing or rib 17' at the margin of the said outlet or passage, and when the diaphragm vibrates toward the outlet, part of the air in the sound box will be partially trapped by the diaphragm in this recess or chamber 18' and compressed to a greater extent than would be the case if the passage of air through the outlet were not thus restricted. This compressing of the air in the recess or chamber 18' may also serve to cushion the diaphragm and some of the air thus compressed will be sharply forced through

the restricted opening between the diaphragm and the edge of the rib or projection 17', and the air thus issuing through the said chamber into the sound conveying opening in the back of the sound box would move at a higher velocity than in a sound box constructed without said rib. While the annular portion of the diaphragm surrounding the annular projection or rib 17 may be thus cushioned or restrained and the passage of air from this chamber 18' of the diaphragm through the outlet to the sound conveying tube or opening is restricted, the central circular portion of the diaphragm bounded by the said annular projection is free to set up vibrations directly in a straight line through the opening in the back of the sound box to the sound conveying tube and the character of the sound waves may thus be largely determined by the action of this central portion of the diaphragm as well as by the action of the air ejected into the said outlet from the recess or chamber 18'. This construction gives a reproduction having an unusually clear and definite quality.

For attaching the sound box to the usual sound conveying tube 20, the back plate 5 of the box is provided with a coaxial rearwardly projecting tubular extension 19 communicating with the sound conducting opening 18 and adapted to receive the end of the sound conducting tube 20. The internal diameter of this tubular extension is preferably about the same diameter as the external diameter of the bushing 17 in the back plate, and the bushing is preferably made of about the same thickness as the thickness of the sound conducting tube 20, so that the internal surfaces of the sound conducting tube and the sound conducting opening 18 through the bushing are substantially flush, forming a tubular sound conveyer having a smooth and substantially unbroken cylindrical internal surface.

For holding the back plate 5 in position in the rim 8 of the outer casing of the sound box, a locking ring 6, screw threaded on its external periphery, as shown at 23, is threaded into the rear of the outer casing, the outer casing being provided with internal screw threads 24 to receive the external threads of the ring. The locking ring 6 is provided with spanner holes 25 to receive a spanner wrench for rotating the ring to tighten the same against the back plate 5, and to force the back plate against its seat.

The two gaskets 3 and 4, for supporting the diaphragm, are preferably made of rubber, or other yielding material, and are each in the form of a solid ring having a body portion substantially rectangular in cross section but having its corners slightly rounded as at 26. Each of these gaskets is provided upon one of its side faces with an annular rib or continuous projection 27 co-

axial therewith which tapers outwardly in cross section from the body of the gasket and terminates in a narrow flat face parallel to the flat sides of the gasket. The sides or peripheral edges of the rib are preferably

5 concave and curved in cross section and tangential to the adjacent side of the body of the gasket.
The gaskets are positioned upon their
10 seats in the casing as heretofore described, so that their ribs will be facing each other, one gasket being placed in the front groove 12 with its rib 27 extending rearwardly and the other gasket being placed in the rear
15 groove 16 with its rib 27 extending forwardly. The gaskets are substantially identical in form and size, and are made of such proportions that when the diaphragm is in position between them and the back plate is
20 inserted within the outer casing, with its flange 14 abutting against the shoulder 13 of the outer casing, the diaphragm will be held yieldingly in position between and by the ribs of the gaskets. The flat outside face
25 of each gasket resting in the seat, forms a firm support for the gasket and prevents its displacement and the gasket is preferably oblong in cross section and of greater width than thickness, as shown in Fig. 6, to form a
30 relatively broad supporting surface for the gasket.

The thickness of the gaskets 3 and 4 and the depth of the recesses or grooves 12 and 16, in the casing 1 and backing plate 6 respectively, is made so that when the back
35 plate 5 is screwed down hard upon the internal stop shoulder 13 of the casing, the diaphragm will be held between the ribs of the gaskets 3 and 4 with the requisite and desired pressure so that with uniform gaskets
40 and with a number of sound boxes provided with grooves of the same depth, and the shoulder 13 in the same position with respect to the grooves 12 and 16, a large number of
45 sound boxes can be assembled substantially absolutely alike by merely pressing the back plate 5 up firmly against its shoulder by the locking ring 6.

The diaphragm or vibratory member for
50 compressing sound waves is preferably made of mica or any other suitable resilient material of the usual circular form. The diaphragm is arranged coaxially with the casing and is somewhat less in diameter than
55 the internal diameter of the outer casing so that the periphery of the diaphragm is spaced from the casing.

The stylus bar or diaphragm actuating device, comprises an arm 28, an offset or laterally
60 extending portion 29, and a stylus holder 30. The stylus holder 30 is provided with the usual stylus socket for holding a stylus 31 and with a thumb screw 32 for retaining the stylus in position. The arm 28
65 of the stylus bar is tubular and is connected

at its inner end to the central portion of the diaphragm by any suitable means. The inner end of this arm is preferably substantially circular in cross section and extends
70 outwardly substantially perpendicular to the diaphragm, and then curves to meet the main portion 34 of the arm which extends in a direction substantially parallel to the diaphragm. This main portion 34 of the arm
75 flares outwardly from its junction with the inner end of the arm and is substantially elliptical in cross section, the longer axis of a cross section of the main portion 34 being substantially at right angles to the diaphragm, when the diaphragm is flat. 80

The off-set or laterally projecting portion 29 of the stylus bar connects the stylus holder 30 and the arm 28 of the bar, and is yieldingly connected to a supporting member 35, which is rigidly attached to the
85 sound box casing, as will be described hereinafter.

The supporting member 35 comprises a main or body portion consisting of two substantially rectangular flat rigid plates 37
90 and 38, and the major or central portion of a thin flat plate 39 of tempered spring steel or other resilient or yielding material which is clamped between the rigid plates 37 and 38 by means of rivets 40 extending through
95 all the plates and securing them permanently together. The yielding plate 39 is provided with spaced yielding arms 41 and 42 integral therewith which project forwardly from its main portion and from the
100 front edges of the plates 37 and 38, as shown partly in dotted outline in Fig. 3.

The outer casing 1 is provided upon its under surface with a boss or fixed support 43 having an outer plane surface 44
105 substantially rectangular in shape against which is rigidly secured the supporting member 35 by means of screws 45 passing through the supporting member and into the boss. The plane surface of the boss is of
110 substantially the same shape and dimensions as the inner surface of the supporting member and is recessed to receive the heads of the rivets of the supporting member. The supporting member thus bears against the
115 boss throughout substantially the entire extent of the supporting member, thus insuring a very rigid connection between the supporting member and the sound box, and obviating the slight vibration which might
120 arise if the body or main portion of the supporting member projected to any great extent beyond the edge of the boss.

The off-set portion 29 of the stylus bar is composed of three thicknesses of plates 46,
125 47 and 48. Of these the two plates 46 and 47 are of the same size and form and each has a pair of laterally projecting arms 46' and 47' extending in opposite directions respectively from the stylus bar. Between the
130

free ends of these arms are secured the free ends of the projecting resilient arms 41 and 42 of the steel plate 39, by means of rivets 40', thus forming spaced yielding resilient supports for the stylus bar. These two plates 46 and 47 are spaced apart by the third plate 48 which is of the same thickness as the spring arms. The supporting member 35 is recessed centrally on its front edge as at 49 to receive the inwardly projecting central portion 49' of the off-set portion 29 of the stylus bar, and the front surface of the boss 43 is correspondingly recessed, as at 43', to permit of the free oscillation of the stylus bar.

The stylus holder 30 is provided with a collar 30' integral therewith and spaced from its inner end a distance substantially equal to the thickness of the off-set portion 29 of the stylus bar, and the inner end of the stylus holder is rigidly secured by riveting or otherwise, in an aperture extending through the three plates, 46, 47 and 48 in the inwardly projecting portion 49' of the off-set portion of the stylus bar.

The stylus bar is preferably positioned upon the sound box so that the axis of oscillation of the bar and the longitudinal axis of the stylus socket are substantially in the plane of the diaphragm, when the diaphragm is in a flat condition, and the longitudinal axis of the stylus socket is preferably arranged radially of the sound box. The space between the off-set portion of the stylus bar and the adjacent edges of the supporting member 35, is preferably only sufficiently wide to permit of the free oscillation of the stylus bar and the bar is thus restrained to oscillate upon a substantially fixed axis.

For connecting the outer end of the arm 28 of the stylus bar with the off-set portion 29 of the bar, the front portion of the off-set portion 29 is provided with an aperture 50 extending through the plates 46, 47 and 48 into which tightly fits the elliptical outer end of the arm. A comparatively short transversely elliptical tube or bushing 51 of soft annealed brass or other suitable material having its external dimensions substantially the same as the corresponding internal diameter of the outer end of the arm 28, and having its inner end slightly tapered, is then forced tightly into the end of the arm, slightly expanding the arm and compressing the tube and rigidly binding the end of the arm in position in the aperture 50.

While the outer end of the arm 28 and the aperture 50 in the off-set portion 29 are shown as elliptical, other shapes might be employed without departing from the spirit of this invention. The bushing 51 may also be of different shape from that illustrated, so long as it corresponds to the shape of the internal diameter of the outer end of the

arm 28, so that when forced into said arm, it effects a rigid binding of the said arm to the off-set portion 29 of the bar.

The stylus bar may be connected to the diaphragm as heretofore stated in any suitable manner but preferably by means of a head 52 forced in the open end of the bar and the headed screw 53 extending through the diaphragm and threaded into the head.

In assembling the sound box, the stylus bar is so positioned with respect to the diaphragm, that when the stylus bar is not supporting the sound box the bar will be slightly turned or displaced on its axis from its normal position, slightly flexing or applying an initial tension to the spaced spring arms supporting the stylus bar, and the upper end of the stylus bar will consequently exert a slight initial pressure rearwardly against the central portion of the diaphragm, springing or flexing or disbing the diaphragm which is preferably made of mica or other resilient material, slightly in a direction toward the outlet in the back plate of the sound box casing, as shown exaggerated in Fig. 2.

When the sound box, thus constructed, is supported by its stylus upon a sound record in a state of rest or in an inoperative position, the diaphragm will remain in substantially the same flexed condition as when the sound box is not supported by the stylus, but being perhaps slightly more flexed, due to the weight of the sound box on the free end of the stylus, which has a slight tendency to turn the stylus bar about its axis and to increase correspondingly the tension upon the spaced spring arms supporting the bar and the pressure of the upper end of the stylus bar against the diaphragm. When, however, the sound box is in operation and is being propelled, as is customary, across a record by the engagement of its stylus with the record, a pressure sufficient to cause the travel of the sound box will be exerted upon the stylus bar in the direction of the travel of the sound box, as indicated by the arrow in Fig. 2, tending to turn the inner end of the stylus bar outwardly and to relieve the initial inward pressure upon the diaphragm.

The initial pressure or tension upon the diaphragm is adjusted to make it substantially balance the pressure exerted upon the side of the stylus during the operation of the sound box, to propel the sound box across the record, so that acting through the stylus bar, the turning moment of one of these pressures will counterbalance the other and the diaphragm will be under substantially no tension or pressure due to the propulsion of the sound box, when in operation, across the record, and will be substantially free, as far as these forces are concerned, to assume its natural form, which in this case would be that of a flat disk. By

this construction a symmetrical action of the diaphragm is secured, resulting in an improvement in the reproducing qualities of the sound box.

5 It is obvious that this invention may be applied also to other forms than the one illustrated, for instance the sound box might be of the type known as pneumatic, in which a current of air or other fluid is forced
10 through the sound box and the sound waves are impressed upon the fluid current by a vibratory flat, flexible resilient valve or other vibratory means actuated by a stylus bar. In this case the valve or other vibratory
15 means would then take the place of the diaphragm of the sound box illustrated, and when the term diaphragm is used in the claims it is intended to cover any such valve or vibratory means equivalent to a dia-
20 phragm for performing the same function of impressing sound waves.

Although only one form of this invention has been illustrated and described, the invention is not limited to the exact construction set forth, as various changes might be
25 made in applying this invention, without departing from the spirit of the invention or the scope of the appended claims.

Having thus fully described my invention, I claim and desire to protect by Letters
30 Patent of the United States:

1. A stylus bar having a member provided with an aperture, a tubular arm fitting in said aperture, and means within said tubu-
35 lar arm for holding the same in position.

2. A stylus bar having a member provided with an aperture, a tubular arm fitting in said aperture and tubular means fitted tightly within said tubular arm for holding
40 the same in position.

3. A stylus bar having a member provided with an elliptical aperture, an arm elliptical in transverse section fitting tightly in said aperture and an elliptical tubular bushing
45 fitted tightly into said arm to hold said arm and said member rigidly together.

4. A stylus bar having a member provided with an aperture, a tubular arm fitted tightly in said member and a bushing fitted
50 tightly in said arm to hold said arm and said member rigidly together, said arm tapering away from said member and said bushing having its inner end tapered.

5. A gasket for supporting a diaphragm in a sound box comprising a yielding mem- 55 ber substantially rectangular in transverse section and having an annular rib projecting therefrom.

6. A gasket for supporting a diaphragm in a sound box, comprising a solid yielding 60 member substantially rectangular in transverse section and having an annular rib projecting therefrom.

7. A gasket for supporting a diaphragm in a sound box comprising a yielding ring 65 substantially rectangular and oblong in transverse section and an annular rib projecting from one side thereof.

8. A gasket for supporting a diaphragm in a sound box comprising a yielding ring 70 substantially rectangular in transverse section and having rounded corners, and an annular rib projecting from one side thereof.

9. In a sound box, the combination with a diaphragm, of an annular yielding gasket 75 having an annular rib projecting therefrom, said rib having a flattened face in contact with the diaphragm.

10. In a sound box, the combination of a casing, a back plate having a circular rib of 80 curved cross section extending from the back thereof, and a nut, threaded in said casing and seated upon said rib.

11. In a sound box, the combination with a substantially cylindrical casing, of a sub- 85 stantially circular back plate telescoping in said casing, and an annular member engaging said casing and contacting with said back plate only in a substantially circular line, and clamping said casing and said back 90 plate in relatively fixed relation.

12. In a sound box, the combination with a substantially cylindrical casing, of a sub- stantially circular plate telescoping in said casing, and annular means carried by and 95 rotatable coaxially with respect to said casing and engaging said plate only in a substantially circular line and clamping said plate in a fixed position with respect to said casing. 100

In witness whereof I have hereunto set my hand this 26th day of May, A. D. 1909.

WILBURN N. DENNISON.

Witnesses:

FRANK B. MIDDLETON, Jr.,

HARRY E. W. KENNEDY.

RECORD METER FOR TALKING MACHINES,
1,169,317-----P. Catucci,
Patented-Jan. 25, 1916;
Filed-April 17, 1915.

P. CATUCCI.
 RECORD METER FOR TALKING MACHINES.
 APPLICATION FILED APR. 17, 1915.

1,169,317.

Patented Jan. 25, 1916.

2 SHEETS—SHEET 1.

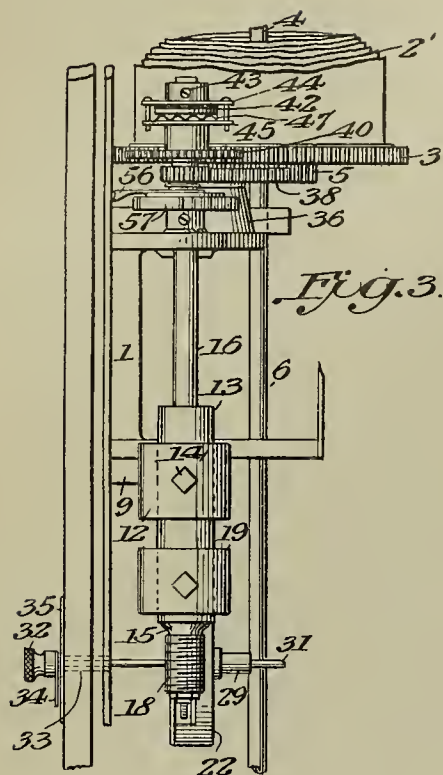


Fig. 3.

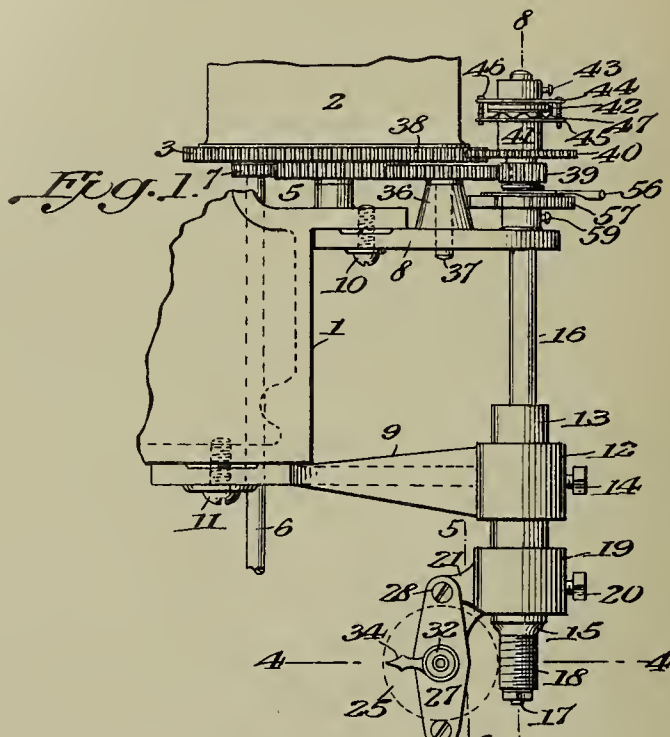
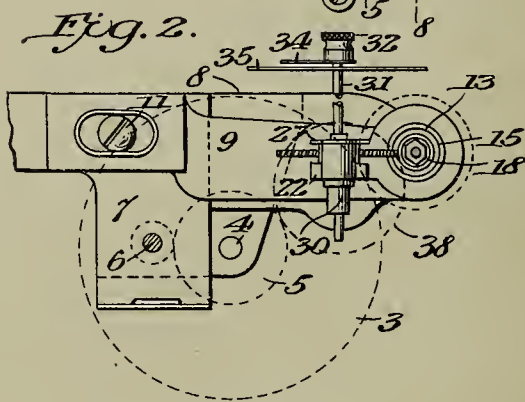


Fig. 1.



P. CATUCCI.
 RECORD METER FOR TALKING MACHINES.
 APPLICATION FILED APR. 17, 1915.

1,169,317.

Patented Jan. 25, 1916.
 2 SHEETS—SHEET 2.

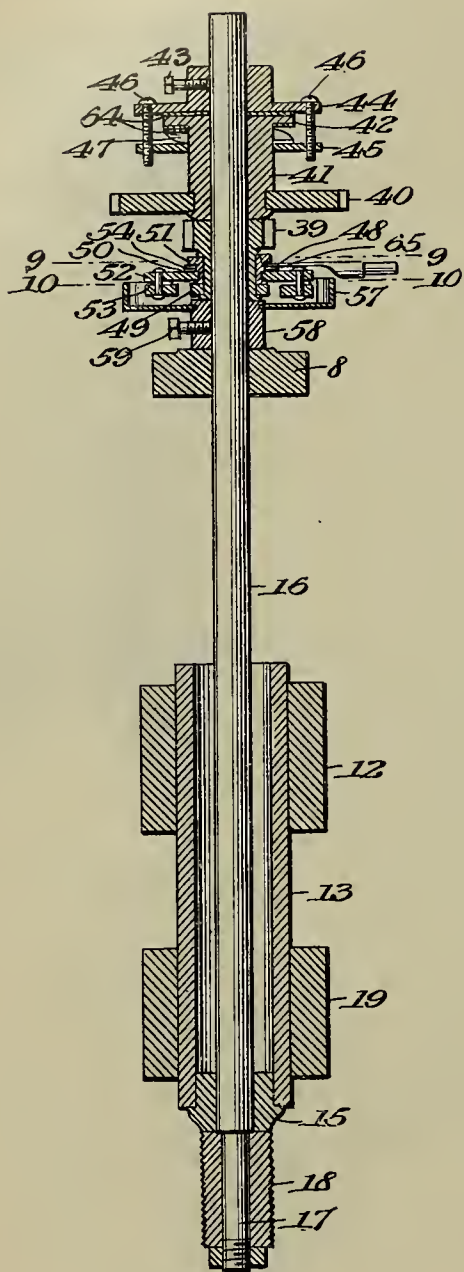


Fig. 8.

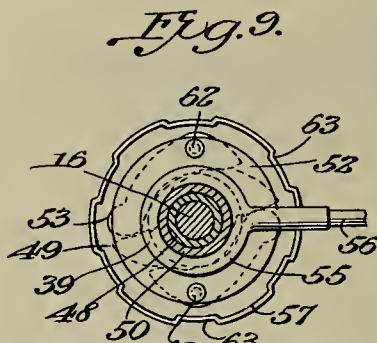


Fig. 10.



Fig. 11.

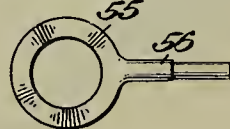


Fig. 12.

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UNITED STATES PATENT OFFICE.

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RECORD-METER FOR TALKING-MACHINES.

1,169,317.

Specification of Letters Patent.

Patented Jan. 25, 1916.

Application filed April 17, 1915. Serial No. 22,000.

To all whom it may concern:

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Record-Meters for Talking-Machines, of which the following is a specification.

With the advent of longer running motors for talking machines has come a demand for some device which shall indicate the length of time which a partly run down motor has yet to run. The length and strength of the motor spring determine the length of time which the motor will run without re-winding. Spring motors are now being made which run from twenty-four to thirty minutes without re-winding, and are capable of reproducing in the ordinary manner, about five 12" records or seven 10" records,—these being the usual standard sizes of disk records. After playing two or three records the operator usually thinks it necessary to re-wind the motor; this is usually a tedious process and sometimes interrupts a well arranged program and may spoil the entertainment.

It is the purpose of my invention to provide the talking machine motor with a meter, or measuring device, which will indicate at any time during the playing of a series of records, the amount or extent which the motor has run down, or what amounts to the same thing, the number of records which may yet be played without re-winding the motor. It is obvious that a device of this kind may be constructed in various ways, but must contain certain essential features; for example, a record meter, during the process of winding up the motor spring must indicate when the motor is completely wound up, and the index must travel in the reverse direction from which it would travel during the running down of the motor.

In the accompanying drawings forming a part of this specification, Figure 1, indicates in plan so much of a phonograph record as is necessary for a full understanding of the operation of my improvement, with such improvement shown as an attachment secured to the motor frame. Fig. 2, is an end elevation of the device. Fig. 3, is a side elevation. Fig. 4, is a section on line 4—4 of Fig. 3. Fig. 5, is a section on line 5—5 of Fig. 3. Fig. 6, is a diagram of the gear plan.

Fig. 7, is a plan view of the index dial and index. Fig. 8, is a section on line 8—8 of Fig. 1. Fig. 9, is a section on line 9—9 of Fig. 8. Fig. 10, is a section on line 10—10 of Fig. 8, but with the clutch members engaged. Fig. 11, is a plan, and Fig. 12, is a side elevation of the clutch drag.

Similar letters of reference refer to like parts throughout the specification and drawings.

I have only shown so much of a motor and frame as is necessary to gather a full understanding of the operation of my device. The motor frame 1, may be of any usual or preferred type, the one illustrated being a well known motor now on the market. Mounted upon the frame 1, is a spring barrel 2, which contains the main or driving spring 2' of the motor. To the end of the spring barrel 2 is rigidly secured the driving gear 3, which drives the motor train. Upon the shaft 4, of the spring barrel, is rigidly mounted the winding gear 5; the winding shaft 6, is carried in bearings in the motor frame 1, and has at one end thereof, a winding pinion 7, in engagement with the winding gear 5. It is obvious that the rotation of the shaft 6 will therefore wind up the spring within the spring barrel. Rigidly secured to the motor frame 1, are the two shaft hangers 8 and 9 respectively secured in place by means of the bolts 10 and 11. The outer end of the hanger 9 is enlarged to form a bearing 12, within which is carried an adjustable sleeve 13, the adjustment of which is secured by means of a set screw 14, screwed through the bearing 12 and engaging the the surface of the sleeve 13. In this manner the sleeve 13 may be longitudinally adjusted within the bearing 12. The outer end of the sleeve 13 is provided with a journal bearing 15, within which rotates the shaft 16. The bearing 15 may be secured in the end of the sleeve in any convenient manner, as by the well known process of sweating, or it may be given a driving fit. The outer end of the shaft 16 is reduced as at 17, and has rigidly secured thereon, a worm 18. The other end of the shaft 16 is carried in a bearing in the shaft hanger 8, and projects for a considerable distance beyond said shaft hanger in order to carry upon the free end thereof, the gear and clutch mechanism which forms the essential part of my improvement.

Adjustably secured upon the outer free end of the sleeve 13 is a bracket 19, held in place by means of a set screw 20; in this manner the bracket 19 may be adjusted
 5 either longitudinally upon the sleeve 13, or circumferentially around said sleeve. The bracket 19 is provided with a lateral projection 21, and an arm 22, which extends substantially parallel to the axis of the shaft
 10 16. The arm 22 is provided with a central aperture 23 to receive a sleeve shaft 24. Rigidly secured to the sleeve shaft 24 is a worm wheel 25, in position for engagement with the worm 18. The sleeve shaft 24 is
 15 provided with a shoulder 26 upon its under side to bear upon the under side of the arm 22, and when the gear 25 is rigidly secured to the upper end of the sleeve shaft 24, said sleeve shaft will be firmly held in the bearing without danger of separation therefrom.
 20 I may provide a plate 27, centrally apertured to receive the upper end of the sleeve shaft 24, and secure the same to the arm 22 by means of the screws 28 at each end thereof. The sleeve shaft 24 is extended somewhat below the arm 22, as at 29, and provided with several longitudinal slits as at
 25 30, and the parts of the extension are pinched together so as to form a kind of pinch clutch mechanism, so that when the index shaft 31 is inserted into the hollow sleeve shaft 24, it will be held quite firmly in place and yet the index shaft 31 may be withdrawn, or it may be rotated around
 30 within the sleeve shaft 24, when desired by turning the thumb piece 32.

When in position in a talking machine, the top of the talking machine case is provided with an aperture 33, which registers
 40 with the sleeve shaft 24, so that the index shaft 31 may be inserted through said aperture into said sleeve shaft; the upper end of the index shaft 31 is provided with an index pointer 34, which, upon the rotation of the shaft 31, will traverse the index dial 35.
 45 The adjustability of the bracket 19 is designed for the purpose of permitting the index dial and pointer 34, either to be located upon the top of the talking machine case, or upon its side, as may be desired, for
 50 the shaft 16 is ordinarily located in position just within the side of the case and the bracket with its arm 22 may be adjusted to a position at right-angles to that indicated
 55 in Fig. 1, so that the index shaft 31 may be inserted from the side of the talking machine case if desired.

The shaft hanger 8 is provided with an apertured bearing boss 36, which carries a
 60 shaft 37, upon the outer end of which is located an idler gear 38, in engagement with the winding gear 5. Upon the shaft 16, in position for engagement with the idler gear 38 is mounted a pinion 39; the hub of said
 65 pinion carrying a part of the clutch mechanism hereinafter described.

Just outside of the pinion 39, upon the shaft 16 is located a gear 40 in engagement with the main driving gear 3. It will be noted therefore, that
 70 there are two trains of gears leading from the winding drum shaft 4, to the shaft 16,—namely gear 3, in engagement with gear 40, and gear 5 driving the gear 39 through the idler gear 38. The ratio of these gear trains
 75 must be the same.

In practice I have found the ratio 8:3 to give satisfactory results; for example, the driving gear 3, has 128 teeth and the gear 40 has 48 teeth; the gear 5 has 48 teeth, and the gear 39 has 18 teeth, thus it will be seen
 80 that the ratios of the two trains of gears are the same.

From reference to Fig. 6, it will be noted that the driving gear 3 normally rotates in the direction of the arrow; this will carry
 85 with it the gear 40 in the direction of the arrow upon its face. The winding gear 5 in the act of winding up the spring, rotates in the same direction as the gear 3 rotates; but through the idler 38 its rotation is communicated to the gear 39 which rotates in the same direction, and in the direction opposite to the gear 40. Thus, the running of the motor rotates the shaft 16 in one direction, but the winding up of the motor
 90 through the gear 5 will rotate the shaft 16 in the opposite direction, but since the ratios of the two gear trains are the same, to whatever extent the main spring in the barrel 2 may run down, the shaft 16 will be correspondingly rotated, but to wind up the main
 100 spring an equal amount, the shaft 16 will correspondingly rotate in the opposite direction.

The details of the clutch mechanism are
 105 more clearly shown in enlarged views 8 to 12 inclusive, to which reference is now made.

The gear 40, which as hitherto described is in engagement with the driving gear 3, is rigidly secured to a hub 41, which in turn is
 110 loosely mounted upon the shaft 16. The opposite end of the hub 41 is provided with a collar 42. Just outside of the collar 42, and rigidly secured upon the shaft 16 by means of a set screw 43, is a friction disk
 115 44. Mounted upon the hub 41 is an apertured friction disk 45, which is connected to the disk 44 by a plurality of screws 46, by which the disk 45 may be adjusted toward and away from the disk 44. Between the
 120 collar 42 and the disk 45, is located a corrugated spring washer 47, the corrugations of said washer being sufficient to span the space between the adjacent faces of the disk 45 and the collar 42. When the set screws
 125 46 are properly adjusted, a considerable friction will be exerted by the disks 44 and 45, upon the collar 42, through the spring pressure of the corrugated washer 47, so that when the gear 40 is rotated by the gear
 130

3, its rotation will be communicated to the shaft 16; this rotation takes place whenever the motor is running, and since the rotation of the shaft 16 is communicated through the mechanism hitherto described to the index 34, the position of the index pointer 34 upon the face of the dial 35, will indicate the extent to which the motor spring has run down. But alone this mechanism will not reverse the direction of the pointer 34, so as to indicate the degree to which the spring may be wound up. Additional gear and clutch mechanism are therefore required to operate the shaft 16 in the opposite direction, so that during the winding up of the motor, the index pointer 34 may be reversely operated to indicate the degree of tension, or the amount of winding up of the motor spring. As hitherto described, the second train of gears, namely 5, 38 and 39, are required. The gear 39 is loosely mounted to rotate freely upon the shaft 16. The hub 48 is considerably elongated and reduced as shown in Fig. 8, and has rigidly secured upon its outer end a clutch cam 49, the peculiar contour of which is clearly illustrated in Fig. 10.

Loosely mounted to freely rotate upon the hub 48, is a sleeve 50, having a collar 51 at its end, adjacent to the gear 39, and having rigidly secured upon its opposite end the disk 52. Diametrically located upon the disk 52, and pivoted at 62, are the two clutch elements 53, which are identical in shape, and of the contour illustrated in Fig. 10. Between the collar 51 and the face of the disk 52, is a groove 54; within said groove is located a corrugated spring drag ring 55, the corrugations of which are of sufficient depth to bear upon the collar 51 and the adjacent face of the disk 52. This drag ring 55 is provided with a laterally projecting arm 56, which in practice is of sufficient length to engage some rigid part either of the motor frame or its case. I have shown it of sufficient length to engage the apertured boss 36 upon the shaft hanger 8, when said arm 56 is swung around upon the shaft 16. Adjacent to the disk 52 is the cup-shaped clutch member 57, rigidly mounted upon the hub 58, which in turn is firmly secured to the shaft 16 by means of the set screw 59. The flange of the member 57 is provided with a series of radial indentations 63. If desired, friction washers 64 may be inserted on each side of the collar 42, and a similar washer 65 between the drag 55 and disk 52.

The operation of the entire structure is as follows: Assuming that the motor spring is completely wound up, the index 34 will be swung around to contact with the starting pin 60. If for any reason the index shaft 31 is not properly adjusted the contact of the point of the index 34 with the starting

pin 60 will stop said index and hold the same in that position until the motor is completely wound up, so that when the motor starts the index 34 will start from the starting pin 60. As above described, when the motor is running the rotation of the main driving gear 3, due to the running down of the spring, will be communicated to the shaft 16, thence to the worm 18, to the worm wheel 25, and finally to the index pointer 34. The ratio gear is so calculated that when the index pointer 34 has traversed the face of the index dial 35, and reaches the stop pin 61, the motor will have completely run down; but from the fact that as the motor spring runs down, the spring itself becomes weaker and weaker, it is not desirable to utilize more than three-fourths of the capacity of the spring; for this reason it will be noted that the stop pin 61 is located a considerable distance from the end of the divisions on the dial. The dial 35 is properly calibrated to indicate the number of standard records which a single winding of the motor will play. In the present case, five 12" records, or seven 10" records are indicated, but it will be understood that if smaller records are used a single complete winding of the spring will be sufficient to run a larger number of records and the dial would be correspondingly divided; if larger records than 12" records are used, then a fewer number can be played with a single winding and the dial will be correspondingly divided. If, after partially running down, it is desired to re-wind the motor spring, this is done by attaching the usual crank to the outer end of the winding shaft 6, and rotating the same clock-wise. As hitherto stated, the rotation of the shaft 6 will be communicated through the pinion 7 to the winding gear 5, which is rigidly mounted upon the end of the spring shaft 4. The rotation of the shaft 5 will be communicated through the idler 38 to the gear 39, which is loosely mounted upon the shaft 16. The independent rotation of the gear 39 upon the shaft 16 will carry with it the disk 52 until such time as the arm 56 shall come in contact with some rigid part of the mechanism, as for example, the boss 36. The drag exerted by the corrugated ring 55 upon the disk 52 will therefore stop the continued rotation of the disk 52 and sleeve 50, while the gear 39 continues to rotate. The stopping of the rotation of the disk 52, while the gear 38 and the clutch element 49 continue to rotate, will result in the crowding of the circular ends of the clutch elements 53 outward around the pivots 62, into the position shown in Fig. 10, where the circular ends will engage the radial indentations 63 in the flange of the cup 57, and thus firmly clutch the gear 39 to the cup-shaped clutch member 57; but since said clutch member 57

is rigidly connected to the shaft 16, the resultant is the rotation of the shaft 16 in the opposite direction to which it was rotated through the gears 3 and 40. Since this clutch mechanism is positive and the engagement of the disks 44 and 45 with the collar 42 through the corrugated spring 47 is only frictional, the shaft 16 will be rotated in the opposite direction to that which it is normally given by the rotation of the gear 3, so that the shaft 16 rotating in the opposite direction, will serve through the mechanism hitherto described, to swing the index 34 back toward the starting pin 60, whenever and as often as the winding shaft 6 is rotated. When the winding operation is completed the shaft 4 and the gear trains 5, 38 and 39 become stationary, and the rotation of the gears 3 and 40 will then be communicated directly to the shaft 16, through the friction disks 44 and 45 and corrugated spring 47.

The winding up of the motor spring may take place when the motor is running without interfering at all with the meter mechanism except to combine in it both the rotation due to the winding of the shaft 6, and the running down rotation of the gears 3 and 40; this combination of motion in the two trains of gears will therefore be accurately reproduced upon the index dial 35.

I believe that I am the first to design a self-compensating record meter for talking machines which will indicate, under all conditions of operation, the exact state of the motor, and I therefore desire to claim the same in the broadest language consistent with the scope of my invention. It is quite obvious that other forms of mechanism might be utilized for accomplishing the same result, and I believe that they will necessarily include a double train of gears leading from the spring shaft to an index shaft with suitable clutch mechanism connecting each of said trains of gears to said shaft, whereby the operation of one train of gears will rotate said shaft in one direction while the operation of the other train of gears will rotate in the opposite direction.

While I have described my invention in connection with a talking machine motor, yet it is obvious that it is capable of use in other relations, wherever it is desired to indicate the storing of energy in the spring of a spring motor. The pointer, as it traverses the index dial, will always indicate the degree of exhaustion of the energy stored up in the spring, or what amounts to the same thing, the amount of energy remaining in the spring after it has partially run down. Broadly considered, then, the device may be called an energy meter inasmuch as it is intended to indicate or measure the amount of energy which is either stored up in a spring or which remains in the spring after the same

has partially run down. The index dial, as shown in the drawings, is divided to indicate the number of standard talking machine records which can or may be played by the motor, but said dial may be otherwise divided to indicate degrees of exhaustion of the spring, or the amount of energy remaining in the spring at any point in the process of utilization of such energy. I do not, therefore, desire to confine the invention to talking machine motors alone, and have therefore claimed the same broadly as applicable generally to spring motor meters or energy meters.

I claim:

1. In a record meter, the combination of a spring motor, with an index dial and a pointer mounted over said dial, means actuated by said motor to cause said pointer to traverse the face of said dial in one direction while said motor is running, and means for causing said pointer to traverse said dial in the opposite direction when said spring motor is being wound up.

2. In a record meter, the combination of a spring motor with means for winding up the spring of said motor, an index dial and pointer, means actuated by said motor for causing said pointer to traverse said dial in one direction when said motor is running, and means actuated by said winding means for causing said pointer to traverse said dial in the opposite direction when said winding means is operated to wind up the spring of said motor.

3. In a record meter, the combination of a spring motor with means for winding up the spring of said motor, an index dial and pointer therefor, a shaft geared to said pointer for causing the same to traverse said dial in either direction, means connecting said shaft with said motor for rotating said shaft in one direction, and means connecting said shaft with said winding means for rotating said shaft in the opposite direction.

4. In a record meter, the combination of a spring motor, a winding shaft geared to the spring of said motor for winding up said spring, an index shaft geared to said motor, and a train of gearing from said winding shaft to said index shaft, an index dial and a pointer for traversing said dial and gear connections between said pointer and said index shaft whereby the running of said motor will cause said pointer to traverse said dial in one direction and the rotation of said winding shaft will cause said pointer to traverse said dial in the opposite direction.

5. In an energy meter, the combination of a motor, with means for storing energy therein, an index dial and a pointer, means actuated by the discharge of energy by said motor for operating said pointer to indicate upon said dial the amount and rate of such

discharge, and means actuated by the storing means for operating said pointer to indicate upon said dial the amount of energy stored in said motor.

5 6. In an energy meter, the combination of a spring motor, means for storing energy in the spring thereof, an index dial and a pointer therefor, means actuated by the discharge of energy from the spring of said
10 motor for operating said pointer to indicate upon said dial the amount and rate of such discharge, and means actuated by said storing means for operating said pointer to indicate upon said dial the amount and rate of
15 energy stored in the spring of said motor.

7. In a record meter for talking machines, the combination of a spring motor having a spring barrel and a main spring secured therein, a spring shaft within said barrel to
20 which said spring is attached, a driving gear rigidly secured to said barrel, a winding gear rigidly secured to said spring shaft, a supplemental shaft, independent gear trains leading respectively from said driving
25 gear and said winding gear to said supplemental gear to drive the same in opposite directions, and index mechanism operated by said supplemental shaft to indicate the direction and rate of rotation of said supplemental
30 shaft.

8. In an energy meter, the combination of a spring motor, means for storing energy therein and for discharging the same therefrom, and means for indicating the rate and
35 amount of energy stored in or discharged from said motor, comprising an index dial and pointer, means connecting said pointer respectively with said storing means and said discharging means and operated there-
40 by to cause said pointer to traverse said dial

and indicate the amount and rate of such storing or discharging of energy.

9. In an energy meter, the combination of a spring motor having a main driving spring, a spring shaft secured to the inner end of
45 said spring, a driving gear secured to the outer end of said spring, a supplemental shaft, independent gear trains leading respectively from said driving gear and said spring shaft to said supplemental shaft to
50 drive the same at equal rates of rotation in opposite directions, and index mechanism connected to said supplemental shaft for indicating the rate of rotation of said driving gear or the rate of rotation of said spring
55 shaft when the same are separately rotated, or to indicate the differentials of their rotations when simultaneously rotated.

10. In an energy meter, the combination of a spring motor having a main driving
60 spring and a spring shaft secured to the inner end of said spring, a driving gear connected to the outer end of said spring and a winding gear rigidly secured to said spring shaft, an index dial and a pointer,
65 a supplemental shaft geared to said pointer to cause the same to traverse said dial, independent gear trains leading respectively from said driving gear and said supplemental gear to said shaft for driving the
70 same in opposite directions, whereby the rotation of said driving gear will cause said pointer to traverse said index dial and thereby indicate the rate and amount of discharge of energy stored in said spring, and the ro-
75 tation of said winding gear will cause said pointer to indicate the rate and amount of the storing of energy in said spring.

PLINY CATUCCI.

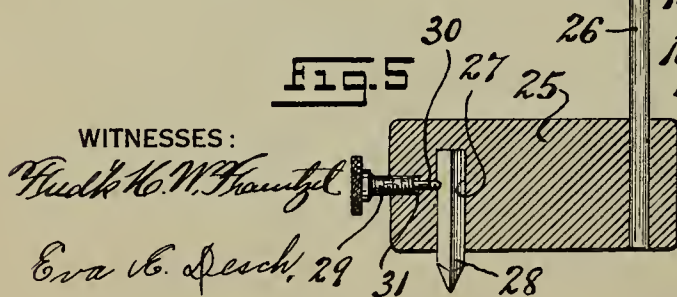
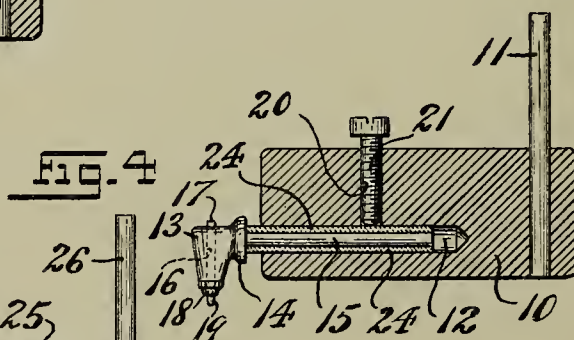
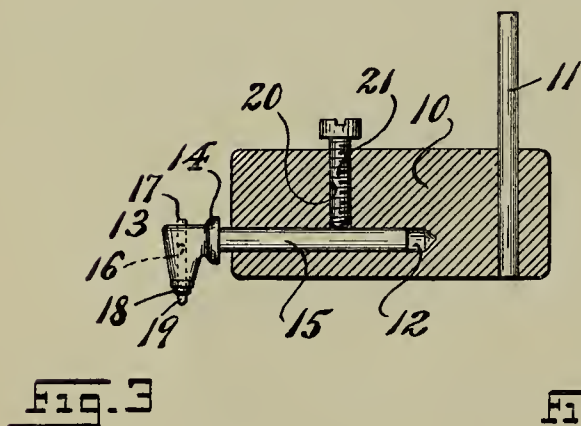
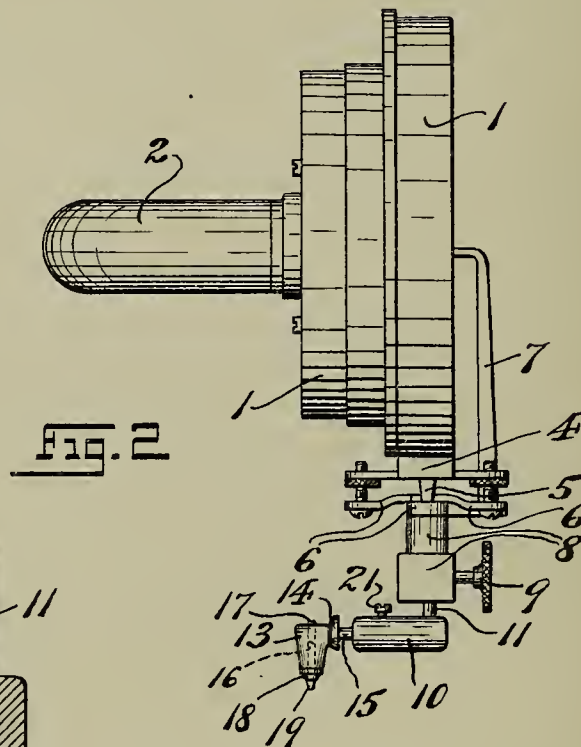
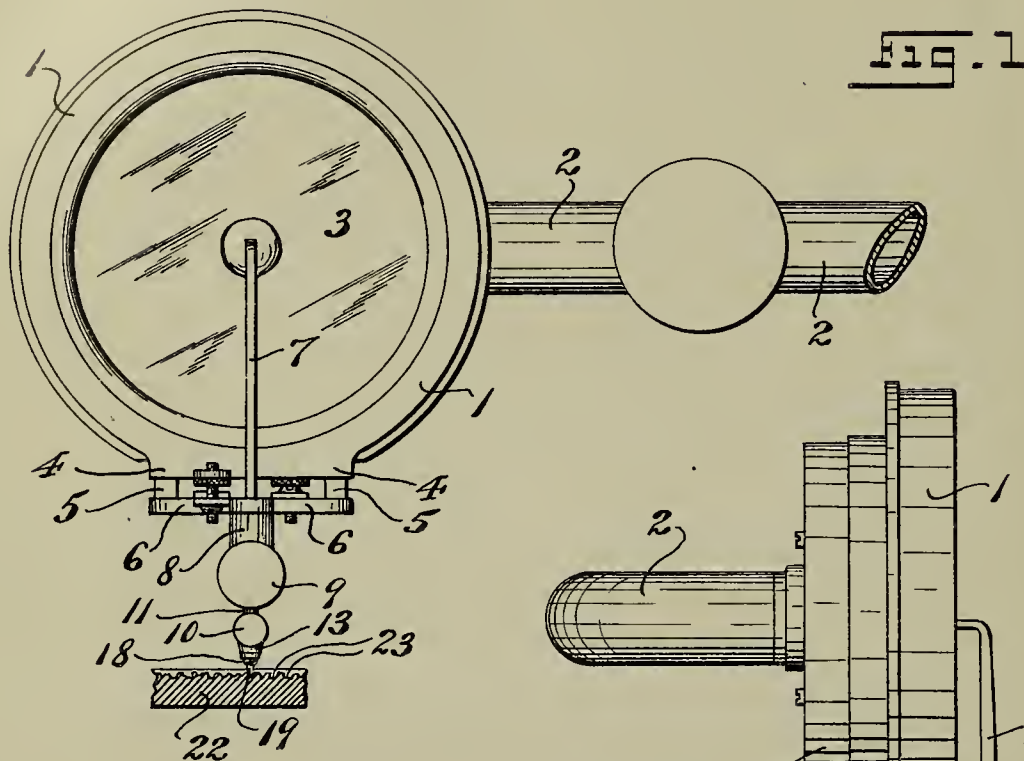
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

ADAPTER STYLUS FOR PHONOGRAPHS,
1,169,861-----E. S. Oliver,
Patented-February 1, 1916.
Filed-March 29, 1915.

E. S. OLIVER.
 ADAPTER STYLUS FOR PHONOGRAPHS.
 APPLICATION FILED MAR. 29, 1915.

1,169,861.

Patented Feb. 1, 1916.



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ADAPTER-STYLUS FOR PHONOGRAPHS.

1,169,861.

Specification of Letters Patent.

Patented Feb. 1, 1916.

Application filed March 29, 1915. Serial No. 17,600.

To all whom it may concern:

Be it known that I, ELLIS S. OLIVER, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Adapter-Styli for Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters or reference marked thereon, which form a part of this specification.

The present invention relates, generally, to improvements in phonograph apparatus; and the invention has reference more particularly to an adapter stylus which will operate to transmit the vertical vibrations produced by the vertical indentations of a sound-record disk to produce the horizontal vibrations of a diaphragm of a reproducing sound-box set in a vertical plane.

It is well known in the art that there are two types of sound-record impression for phonograph disks, viz., the "hill and dale" impressions which consist of a series of vertical indentations or impressions formed in the face of the disk, which, when traveling against a sound-box stylus or needle, produce vibrations of the stylus in a vertical plane, or in a plane parallel to the vertical axis of the stylus or needle; and the horizontal or lateral impressions which consists of a series of lateral or horizontal indentations or impressions formed in the face of the disk, which, when traveling against a sound-box stylus or needle, produce lateral vibrations of the stylus or needle. Usually in a phonograph instrument arranged to play the former type of sound-record disk, the sound-box is positioned so that the diaphragm thereof lies in a horizontal plane and substantially parallel to the disk surface, and the vertical vibrations imparted to the stylus are transmitted directly to the diaphragm; and in a phonograph instrument arranged to play the latter type of a sound-record disk, the sound-box is positioned so that the diaphragm thereof lies in a vertical plane and substantially at right angles to the disk surface, and the horizontal vibrations imparted to the stylus are transmitted indirectly through a pivoted vibrator-arm, to which the stylus is secured, to

the diaphragm. Consequently the sound-box positioned and equipped for playing said latter type of sound-record disk cannot play or respond to the sound-record impressions of the former type of sound-record disk, since the vertical vibrations caused by such sound-record impressions cannot be transmitted through the ordinary stylus or needle and the pivoted vibrator-arm.

It is the principal object of my present invention, therefore, to provide an interchangeable or detachable adapter stylus adapted to be connected with the ordinary needle-socket of the vibrator-arm of a vertical sound-box, in place of the usual type of needle adapted to play horizontal sound-record impressions, so that, without other change, the vertical vibrations recorded by the vertical or "hill and dale" sound-record impressions may be transmitted through such adapter stylus to the pivoted vibrator arm and vertical diaphragm of the vertical sound-box, so that the latter is adapted to reproduce the sounds recorded upon such type of sound-record disk.

Other objects of the present invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the present invention.

With the various objects of the present invention in view, the same consists, primarily, in the novel and simple construction of a detachable or interchangeable adapter stylus for phonograph sound-boxes, hereinafter set forth; and, the invention consists, furthermore, in the several novel arrangements and combinations of the various parts thereof, as well as in the details of the construction thereof, all of which will be more fully described in the following specification, and then finally embodied in the claims which are appended to and which form an essential part of this specification.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a face view of a vertical sound-box, the vibrator-arm of which is equipped with the novel construction of adapter stylus made according to and embodying the principles of the present invention, in this view the said adapter stylus being shown in contact with the vertical sound-record impressions of a "hill and dale" sound-record disk, the latter being shown in section. Fig. 2 is an edge side view of said vertical sound-

box so equipped. Fig. 3 is a longitudinal vertical section of an adapter stylus made according to and embodying the principles of the present invention, the same being
 5 drawn on an enlarged scale. Fig. 4 is a longitudinal section of a modified construction of said novel adapter stylus. Fig. 5 is a similar view of another modified construction of said novel adapter stylus.

10 Similar characters of reference are employed in all of the hereinabove described views to indicate corresponding parts.

Referring now to the said drawings, the reference character 1 indicates a sound-box for playing sound-record disks, said sound-box being so connected with the tone-arm 2 of a phonograph apparatus as to be positioned vertically to dispose the diaphragm 3 there-
 15 of in a vertical plane at right angles to the horizontal plane of the sound-record disk adapted to be revolved beneath said sound-box. Connected with the lower side 4 of said sound-box are the fulcrum-projections or points 5 upon which is fulcrumed the
 20 pivot-frame 6 of an upwardly extending vibrator-arm 7, the upper end of which is connected with the diaphragm 3 in the usual manner. Connected with and extending downwardly from said pivot-frame 6 is the
 25 needle or stylus socket 8, which receives and securely connects in operative relation to said vibrator-arm a needle or stylus adapted to contact operatively with the sound-record impressions of a sound-record disk. Said
 30 needle or stylus socket 8 is provided with the usual set-screw or lock-screw 9 for securing the needle or stylus in the socket 8.

When reproducing from a sound-record disk in which the sound-record impressions
 35 are of the horizontal or lateral form, a straight vertically extending needle or stylus is secured in the socket 8, the same being in vertical alinement with the fulcrum-projections or points 5, so that the
 40 lateral or horizontal vibrations imparted to the needle or stylus point cause a rocking of the pivot-frame 6 which transmits similar horizontal or lateral vibrations to the vibrator-arm 7 which in turn vibrates the
 45 diaphragm 3 to reproduce the recorded sounds from the sound-record impressions.

It will be apparent that, with the type of sound-box, constructed as above described, equipped with a straight needle or stylus
 50 as above mentioned, a sound-record formed with vertical or "hill and dale" sound-record impressions could not be played or its sound-record reproduced, since such vertical or "hill and dale" sound-record impres-
 55 sions would cause a vertical vibration of the needle or stylus point, that is a vibration parallel to the axis of the needle or stylus and in line with the fulcrum-projections or points 5. Consequently no rocking or oscil-
 60 lation of the vibrator-arm 7 would result,

but merely a vertical rise and fall of the entire sound-box bodily, with no vibratory effect upon the diaphragm 3. It is there-
 fore necessary to provide an adapter stylus, which can be used in place of the ordinary
 straight needle or stylus so that through such means the vertical or "hill and dale" sound record impressions may be utilized to
 75 vibrate the diaphragm 3. My present invention provides such an adapter stylus which is of novel and simple construction, and which may be interchangeably used in place of said straight needle or stylus in connection with the socket 8 of the vibrator arm
 80 7 of the same type of sound-box.

My novel adapter stylus comprises a horizontally extending main-body 10, of any desirable cross-sectional shape. Connected rigidly with and extending upwardly from one end of said main-body 10, and at right
 85 angles to the axis thereof, is a butt-piece or shank 11 of a proper diameter to be received or inserted in the socket 8 of the vibrator-arm 7, by which means the adapter stylus is operatively secured to the vibrator-arm 7 in substantially the same manner as an ordinary straight needle or stylus. Formed in the outer or free end of said main-body 10 is a longitudinally extending
 90 tubular opening 12.

The reference character 13 indicates a stylus-head, the same having a shoulder 14 at one end from which extends a horizontal shank-piece 15. Said stylus-head 13 is provided with a vertically extending opening
 95 or socket 16 extending therethrough. Into this opening is inserted the upwardly extending tail-piece 17 of a stylus-point setting 18, which extends and is positioned in a plane below the under side of said main-body 10. The stylus-point 19 is fixed in
 100 said setting 18, and may be made of any suitable material, preferably of diamond or emerald stone. The said shank-piece 15 is slidably received in said tubular opening 12, so that the said stylus-point and its supporting parts may be moved inward or outward to adjust the same toward and away from the main-body 10, so that the leverage
 105 provided through the same and the said main-body may be decreased or increased at will, or in other words adjustable for purposes presently to be more fully disclosed. Said main-body 10 is provided with a vertical internally screw-threaded opening 20 in
 110 which is arranged the threaded shank of a set or lock screw 21, which is adapted to be brought into binding relation to said shank-piece 15 to securely hold the same, and the stylus parts connected therewith, in any desired adjusted position in which the same
 115 has been arranged.

The operation of my novel adapted stylus is as follows:—The butt-piece is inserted in the socket 8 of the vibrator-arm 7 and
 120

locked rigidly thereto by means of the set-screw or lock screw 9. When thus secured the main-body 10 extends horizontally beneath said sound-box and at right angles to the fulcrum-projections or points 5 thereof. As thus positioned the stylus-point 19 carried at the free end of said main-body 10 is off-set or positioned to one side of the pivot or fulcrum axis of the vibrator-arm 7. Now when a sound-record disk 22 provided with vertical or "hill and dale" sound-record impressions 23 is revolved beneath said stylus-point 19 and in contact therewith, a vertical vibration or oscillation of said stylus-point 19 is produced, which effects a vertical vibration or oscillation of the outer end of said main-body 10, but since the stylus-point 19 is off-set from the fulcrum-projections or points 5 of the sound-box this vertical vibration or oscillation when transmitted through said off-set horizontal main-body is translated into a horizontal vibration or oscillation of the socket 8, pivot-frame 6 and vibrator-arm 7, so that the upper end of the latter is vibrated horizontally to produce the proper vibratory effect of the diaphragm 3 of the sound-box. In simple terms instead of the vibration of the said vibrator-arm 7 being effected by a simple lever oscillation, it is effected, as a result of the off-set construction of the adapter stylus, by a bell-crank lever oscillation.

By moving or adjusting the stylus-point 19 and its supporting parts outwardly relative to said main-body 10, by sliding outward said shank-piece 15, the leverage of said off-set portion or main-body is increased relatively to the leverage of the vibrator-arm 7, and since the sound-record impressions 23 always oscillate the stylus-point vertically the same distance in all positions thereof, it follows that by increasing the leverage of said off-set portion or main-body, the oscillations or vibrations of the vibrator-arm 7 and the diaphragm 3 of the sound-box are reduced in scope, that is the arc of movement is shortened, and consequently the tones produced by the diaphragm 3 of the sound-box are reduced in volume or softened. Conversely if the stylus-point 19 and its supporting parts are moved or adjusted inwardly relative to said main-body 10, by sliding inward said shank-piece 15, the leverage of said off-set portion or main-body is decreased relatively to the leverage of said vibrator-arm 7, and consequently the oscillation or vibration of the vibrator-arm 7 and the diaphragm 3 of the sound-box are increased in scope, that is their arc of movement is lengthened, and consequently the tones produced by the diaphragm 3 of the sound-box are increased in volume or loudened. It will therefore be apparent that by such a simple means my

adapter stylus may be delicately adjusted to produce various degrees of tone volume and audible strength, quickly, easily, and efficaciously.

Referring now to Fig. 4 of the drawings, I have illustrated a slight modification of the construction of my novel adapted stylus. In this construction the various essential features are the same as already above described and are indicated by the same reference letters. In addition to said features is provided a resilient coating or sleeve 24 surrounding and fixed upon said shank-piece 15. This sleeve may be made of hardened shellac, collodion, asphaltum, rubber, or any other substance which provides the qualities I seek, namely, a certain limited degree of resiliency, or shock-absorbing effect, which will not, however, impair the proper transmission therethrough, of the vibrations or oscillations imparted to the stylus-point by the sound-record impressions 23. The use of such a resilient body as the sleeve 24, interposed between the stylus-point supporting parts and said main-body 10, tends to soften or sweeten the tones produced by the sound-box diaphragm when vibrated by such novel adapter stylus, and tends to eliminate the harshness, clang, and metallic sounds usually incident, more or less, to phonographic sound reproduction.

Referring now to Fig. 5 of the drawings, I have illustrated therein another modified construction of my novel adapter stylus. This construction comprises a main-body 25, provided at one end with the upwardly extending, rigidly secured butt-piece 26. Located adjacent to the outer end of said main-body 25, and extending upwardly therein from its bottom side, is a vertical receiving socket 27, in which may be inserted the butt end of the well-known reed stylus 28. A set-screw 29, having at its inner end a reduced binding-point 30 is arranged in an internally screw-threaded opening 31, so that the same may be brought into holding or binding engagement with said reed stylus 28 to rigidly secure the same to the main-body 25 in proper downwardly projected relation to the outer end thereof.

I am aware that some changes may be made in the various arrangements and combinations of the various devices and parts, as well as in the details of the construction thereof, without departing from the scope of my present invention. Hence, I do not limit my present invention to the exact arrangements and combinations of the said parts as described in the foregoing specification, nor do I confine myself to the exact details of the construction of said parts as shown in the accompanying drawings.

I claim:—

1. An adapter stylus for a phonograph sound-box having its diaphragm in a plane

substantially perpendicular to the sound-record disk to be reproduced comprising a horizontal body, a vertical butt-piece extending upwardly from one end of said body, said body having a receiving-opening extending longitudinally into the same from its outer end, a stylus-point, means for supporting said stylus-point having a shank-piece slidably entering said receiving-opening, and means connected with said body and adapted to engage said shank-piece to secure said stylus-point supporting means in desired longitudinally adjusted position relatively to said body.

2. An adapted stylus for a phonograph sound-box having its diaphragm in a plane substantially perpendicular to the sound-record disk to be reproduced comprising a horizontal body, a vertical butt-piece extending upwardly from one end of said body, said body having a receiving-opening extending longitudinally into the same from its outer end, a stylus-head having a laterally extending shank-piece slidably entering said receiving opening, a downwardly projected stylus-point carried by said stylus-head, and means connected with said body and adapted to engage said shank-piece to

secure said stylus-head in desired longitudinally adjusted position relatively to said body. 30

3. An adapter stylus for a phonograph sound-box having its diaphragm in a plane substantially perpendicular to the sound-record disk to be reproduced comprising a horizontal body, a vertical butt-piece extending upwardly from one end of said body, said body having a receiving-opening extending longitudinally into the same from its outer end, a stylus-head having a laterally extending shank-piece slidably entering said receiving opening, a downwardly projected stylus-point carried by said stylus-head, and means connected with said body and adapted to engage said shank-piece to secure said stylus-head in desired longitudinally adjusted position relatively to said body, comprising a lock-screw associated with said body. 35 40 45

In testimony, that I claim the invention set forth above I have hereunto set my hand this 26th day of March, 1915. 50

ELLIS S. OLIVER.

Witnesses:

FREDK. C. FRAENTZEL,

FRED'K H. W. FRAENTZEL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

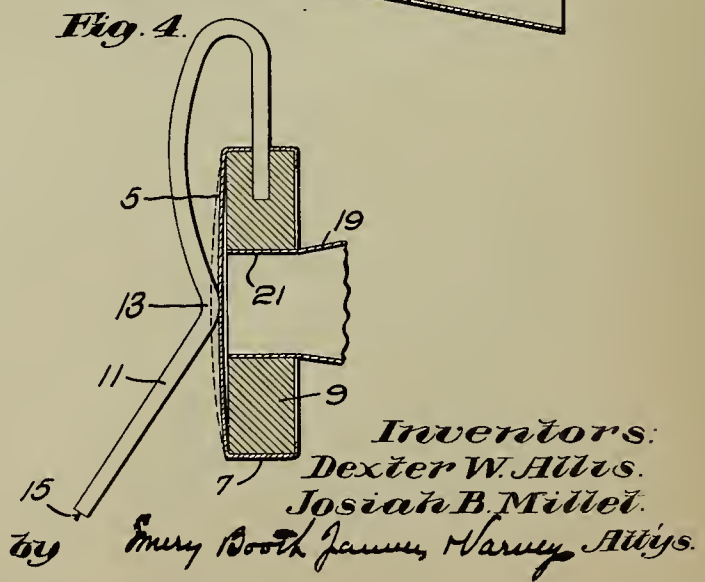
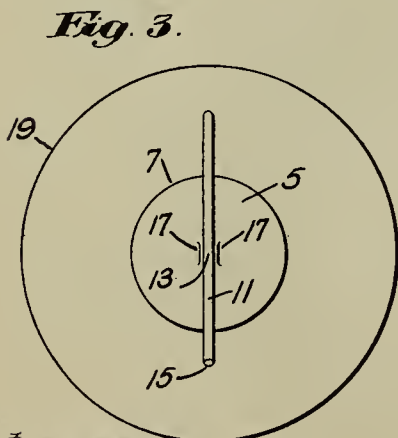
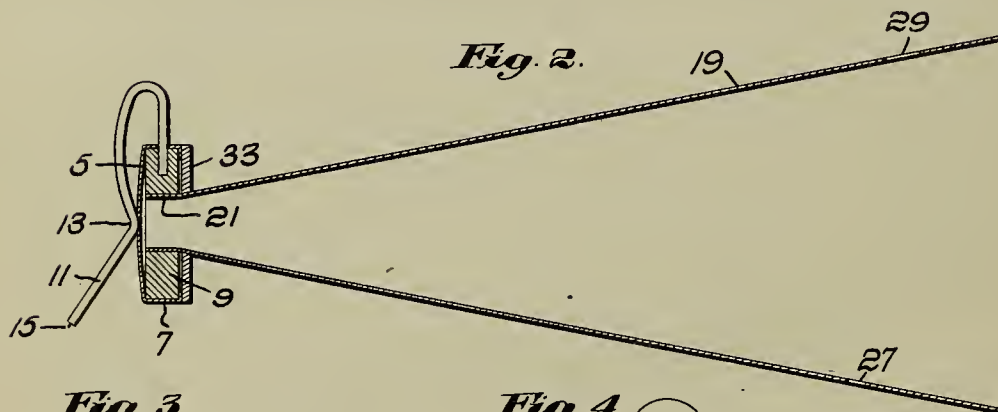
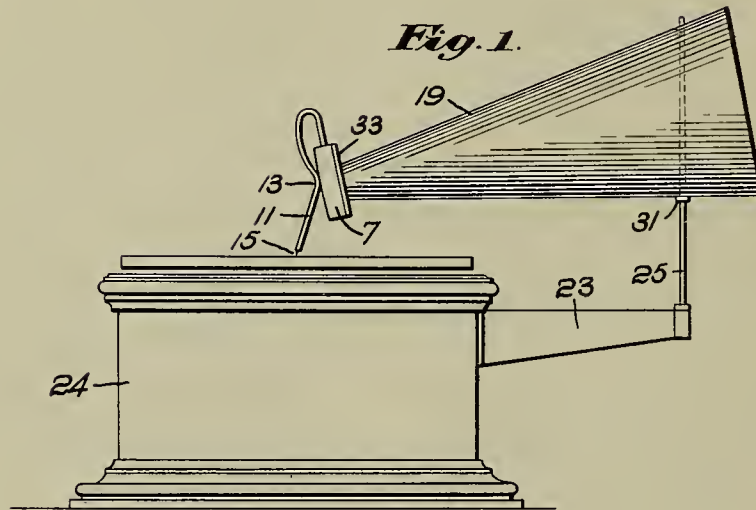
PHONOGRAPH PATENT.

PHONOGRAPH,
1,170,134-----D.W.Allis & J.B.Millet,
Patented-Feb. 1st, 1916.
Filed April 17, 1912.

D. W. ALLIS & J. B. MILLET.
 PHONOGRAPH.
 APPLICATION FILED APR. 17, 1912.

1,170,134.

Patented Feb. 1, 1916.



Witnesses:
 Horace A. Crowman
 Carl L. Choate.

Inventors:
 Dexter W. Allis.
 Josiah B. Millet.
 by Emory Booth James, Harvey Allis.

UNITED STATES PATENT OFFICE.

DEXTER W. ALLIS, OF WHITMAN, AND JOSIAH B. MILLET, OF BOSTON, MASSACHUSETTS, ASSIGNORS TO BOSTON TALKING MACHINE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

PHONOGRAPH.

1,170,134.

Specification of Letters Patent.

Patented Feb. 1, 1916.

Application filed April 17, 1912. Serial No. 691,307.

To all whom it may concern:

Be it known that we, DEXTER W. ALLIS and JOSIAH B. MILLET, citizens of the United States, and residents of Whitman, county of Plymouth, and Boston, county of Suffolk, respectively, State of Massachusetts, have invented an Improvement in Phonographs, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to phonographs, and among other objects provides a sound reproducing mechanism which is cheap to manufacture and is simple in construction and operation.

The character of the invention may be best understood by reference to the following description of an illustrative embodiment thereof shown in the accompanying drawing, wherein:

Figure 1 is a side elevation of an illustrative phonograph embodying the invention; Fig. 2 on an enlarged scale is a vertical section through the sound reproducing mechanism and amplifier; Fig. 3 is an end elevation looking toward the right of Fig. 2; and Fig. 4 is a vertical section through the sound producing mechanism on a larger scale than that shown in Fig. 2.

The illustrative sound reproducing mechanism shown herein as embodying the invention comprises a diaphragm 5 (Fig. 2) of metal or other suitable material conveniently formed in one piece with the sound box shell 7 from a piece of cup shaped material. The back of the sound box is closed by a perforated backing disk 9 of wood or other suitable material, the shell 7 having a portion flanged or clenched over said disk. A stylus bar 11 is provided of resilient wire or other suitable material and one end thereof is attached to the sound box separate from the diaphragm as by fitting said end into registering holes in said cup and disk. The wire bar is arched outwardly from said sound box, thence inwardly toward the center of said diaphragm and then is bent away from the latter to present a bend or bight 13 for engagement with said diaphragm. The free end of said bar carries a stylus 15 herein in the form of the sapphire point usually employed. To maintain said bight and diaphragm in intimate contact so that

vibrations of one will be transmitted to the other, they may have provision for pressing them toward one another. To this end the diaphragm, instead of lying flat against the disk 9, is formed to tend to bulge away therefrom as well shown in dotted lines in Fig. 4. The stylus bar, on the other hand, by its arched form and inherent resilience presses its bight against said diaphragm and tends to flatten said diaphragm somewhat from its dotted position which the inherent resilience thereof would cause it naturally to assume. As a result, they are pressed firmly together and any vibrations of one are transmitted to the other.

By properly proportioning the opposed pressures of the stylus bar and diaphragm, conditions of high sound reproducing efficiency are obtainable.

In view of the fact that the weight of the sound reproducing mechanism is borne principally by the stylus bar and in view of the shape and relation of said bar to the sound box, in use the bar will automatically tend to bend and press against the diaphragm. Hence the work of the arched spring of the bar in maintaining contact of the latter with the diaphragm will be lessened and therefore the spring may be made weaker than if this gravitational effect were absent.

The diaphragm, owing to its bulged form, does not require any supplemental means for pressing the same toward the stylus bar such as might lessen its vibratory effectiveness. To locate or position the place of contact of said stylus bar bight with said diaphragm, the latter may be scored or otherwise shaped to present elevations 17 forming between them a seat for receiving the bight of said bar.

A suitable sound amplifying device is provided herein shown as a horn 19 connected to the sound box in any suitable manner as by a neck 21 thereof. Since the backing disk of the sound box is thick and massive, it is substantially non-vibratory and all the sound from the sound box passes to the horn.

The sound reproducing mechanism and amplifier may be supported in any suitable manner. As shown herein, an arm 23 is provided projecting laterally away from a usual record table base 24 and supports at its outer end an upright post 25 projecting

up through an aperture 27 in the lower side of the horn and through an elongated aperture 29 in the opposite side of the horn. The horn may rest on a collar 31 on said post. The preponderance of the weight of the sound reproducing mechanism will be at the stylus side of said post and will be sufficient to cause the stylus to properly engage and travel along the record. In some instances the weight may be increased as by a lead washer 33 secured to said sound box in any desired manner.

By our invention the phonograph sound reproducing mechanism is reduced to its simple fundamental elements and without sacrifice in sound reproducing efficiency. It will be observed that in accordance with the construction shown the diaphragm is directly connected to the stylus by the bar 11 and there are no joints in the connection susceptible of play, lost motion or other disturbances such as would tend to interfere with the accurate transmission of the vibrations from one to the other, but on the contrary the vibrations are accurately transmitted in a highly effective manner.

While there is shown herein for the purposes of illustration one specific embodiment of the invention it is to be understood that the same is not limited thereto, but that extensive deviations therefrom may be made without departing from the spirit of the invention.

What we claim as new and desire to secure by Letters Patent is:

1. In a phonograph, the combination of a cup shaped sound box formed to present a bulged resilient diaphragm integral therewith, a disk in said box, and an integral

stylus bar fast to said box and formed to present a bight for light engaging contact with said diaphragm.

2. In a phonograph, the combination of a sound box having a bulged side forming a diaphragm and a resilient stylus bar having one end fast to said box and a stylus at its opposite end, said bar being bent intermediate its ends to present a bight for engagement with said diaphragm.

3. In a phonograph, the combination of an integral cup shaped metal sound box formed to present a diaphragm, and a stylus bar comprising a rod having an end secured to said box, an end for connection with a stylus, and a part formed to present a portion separate from but engaging said diaphragm.

4. In a phonograph, the combination of a cup shaped sound box formed to present a resilient diaphragm, an apertured disk in said box substantially filling the same, and a stylus bar having an end fast to said disk and an end rigidly connected with a stylus, a portion of said bar being adapted to engage said diaphragm, the resilience of said diaphragm serving to urge the same toward said bar.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

DEXTER W. ALLIS.
JOSIAH B. MILLET.

Witnesses for Dexter W. Allis:

ROBERT H. KAMMLER,
F. IRENE CHANDLER.

Witnesses for Josiah B. Millet:

THOMAS B. BOOTH,
ROBERT H. KAMMLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH PATENT.

PHONOGRAPH OR TALKING MACHINE,
1,170,358-----D. Holden,
Patented-Feb. 1st, 1916.
Filed-July 14th, 1913.

D. HOLDEN.
 PHONOGRAPH OR TALKING MACHINE.
 APPLICATION FILED JULY 14, 1913.

1,170,258.

Patented Feb. 1, 1916.

Fig. 1

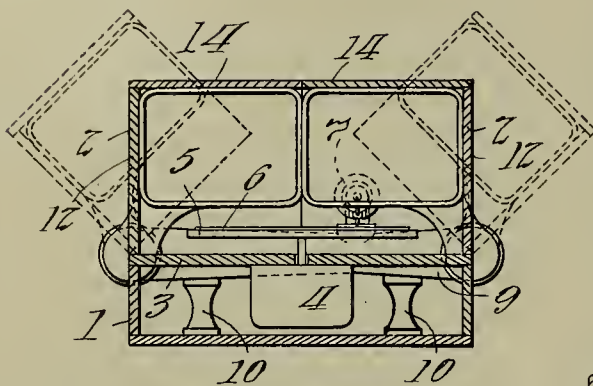


Fig. 3

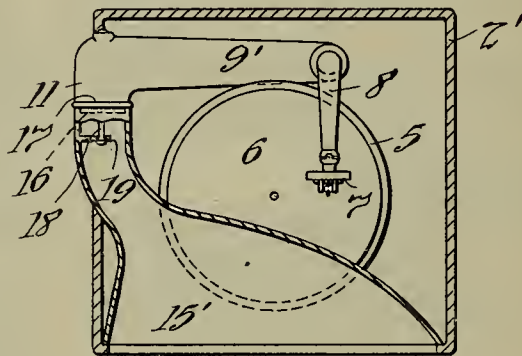
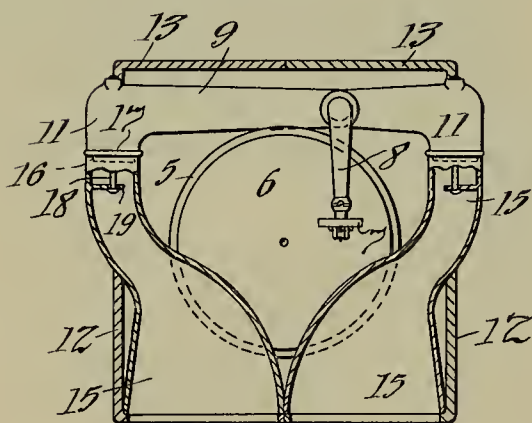


Fig. 2



Witnesses:

J. H. Dresser
Frederick Bachmann

Inventor:

Delos Holden
by Dyer & Holden

his Attys.

UNITED STATES PATENT OFFICE

DELOS HOLDEN, OF EAST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH OR TALKING-MACHINE.

1,170,258.

Specification of Letters Patent.

Patented Feb. 1, 1916.

Application filed July 14, 1913. Serial No. 773,824.

To all whom it may concern:

Be it known that I, DELOS HOLDEN, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs or Talking-Machines, of which the following is a description.

My invention relates to phonographs or talking machines and more particularly to phonographs or talking machines of the cabinet type having a movable cover which contains the usual horn or sound amplifier.

The principal object of my invention is to provide an improved device of this character having one or more covers which may be opened or closed without forming a break in or interrupting the continuity or varying the length of the sound conveying passage or passages through which the sound waves from the reproducer pass to the atmosphere, the generic invention and one species thereof being claimed in an application, Serial No. 763,702 filed by me on April 26, 1913 and entitled phonographs or talking machines. In this application I shall describe and claim another species of the invention.

In order that the invention may be more clearly understood, attention is hereby directed to the accompanying drawing forming a part of this specification and in which—

Figure 1 is a view partly in vertical section and partly in elevation showing a talking machine embodying a form of my invention comprising a plurality of covers and amplifiers, the covers being shown in open position in dotted lines; Fig. 2 is a view of the same partly in plan and partly in horizontal section; and Fig. 3 is a view similar to Fig. 2 of a talking machine containing another embodiment of my invention.

In all the views like parts are designated by the same reference numerals.

Referring to the drawing and more particularly to Figs. 1 and 2 thereof, the cabinet shown comprises a base or body portion 1 and hollow covers 2 pivotally supported in a manner hereinafter more fully described. A horizontal partition plate or other similar support 3 extends across and is secured in any suitable manner to the top of the

body portion 1 of the cabinet, the partition plate supporting on its lower side a casing 4 which incloses a motor (not shown) for rotating the turntable or support 5 upon which the sound record 6 to be reproduced is adapted to be supported. A reproducer 7 arranged for operation on the record 6 communicates with and is carried by a tapered sound conveying arm 8 which is provided at its rear with a downwardly extending portion communicating with and pivotally supported by a tubular sound conveying member 9. The sound conveying member 9 is stationary and may be secured to the cabinet in any suitable way, as by means of brackets 10. The said member 9, in the form of my invention shown in Figs. 1 and 2, extends transversely of the cabinet from one side to the other and is preferably of increasing cross section from the point at which the sound waves from the reproducer are discharged into the same by the arm 8 toward its opposite ends at the sides of the cabinet. The ends of the sound conveying member 9 are provided with forwardly extending outlet portions 11, the axes of which are parallel and are located at the intersection of the top surface of the support 3 and the outer surfaces of the side walls of the cabinet. Each of the covers shown in Figs. 1 and 2 comprises a side wall 12, a rear wall 13, and a top wall 14, the inner edges of the top and rear walls of one cover being adapted to contact with the corresponding edges of the top and rear walls of the other cover when the covers are closed, as shown in Fig. 1. Each cover incloses and has secured thereto in any suitable manner a sound amplifier 15, the mouth of which is located in the open front portion of the cover, the small end of each amplifier extending in axial alinement with one of the portions 11 of the sound conveyer 9. The sound conveyers are so connected to the parts 11 as to permit raising or lowering of the covers and the amplifiers connected thereto without forming a break in or interrupting the continuity or varying the length of the sound passage at the points where the same are connected. Each part 11, as shown, is provided with a portion 16 fitting within the smaller end of the amplifier with which it communi-

cates, the amplifier bearing against a circular collar 17 on the part 11. A rod 18 having headed ends bearing respectively against the rear end of the part 11 and a bracket 19 in the amplifier serves to hold each amplifier in proper position with respect to the sound conveyer 9 and the corresponding cover in proper position with respect to the base of the cabinet.

The device disclosed in Fig. 3 differs from that disclosed in Figs. 1 and 2 only in that a single cover 2' carrying a single amplifier 15' is employed in place of the two covers and amplifiers shown in Figs. 1 and 2, and in that the stationary sound conveying member 9' with which the arm 8 communicates extends only to one side of the cabinet, the connection of the same with the sound amplifier being identical with that disclosed for each amplifier in Figs. 1 and 2. The single cover of the device disclosed in Fig. 3 will, of course, have two side walls, whereas the covers of the device of Figs. 1 and 2 have but a single side wall.

In both forms of the invention herein disclosed, each cover and the sound conveyer movable therewith are mounted for pivotal movement about the same horizontal axis, which latter coincides with the center or axis of the tubular member 11 and the smaller end of the amplifier and with the axis of the rod 18. There is a continuous sound conveyer of fixed or uniform length extending from the reproducer to the exit of the amplifier regardless of the position of the cover or covers, the amplification due to the tapering of the sound conduit beginning at a point adjacent the reproducer and continuing gradually to the exit of the sound conveyer. The reproducer and the record support are adapted to remain in operative relation to each other regardless of the position of the cover.

It is understood that my invention is not limited to the precise apparatus shown, but may be varied within the scope of the appended claims without departing from the spirit of my invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. In a phonograph or talking machine, the combination of sound reproducing apparatus, a pivoted cover therefor, and a sound amplifier movable with said cover and connected with said sound reproducing apparatus, the pivotal axis of said cover passing through the axis of the smaller end of said amplifier and extending lengthwise of the exit portion of said amplifier, substantially as described.

2. In a phonograph or talking machine, the combination of a record support, a reproducer in operative relation thereto, a plurality of covers for said reproducer and record

support movable about different axes, each of said covers having a sound amplifier movable therewith, and sound conveying means connecting all of said amplifiers with said reproducer, substantially as described.

3. In a phonograph or talking machine, the combination of sound reproducing apparatus, a pivoted cover therefor, a sound amplifier movable with said cover, and a fixed tubular member communicating with said sound reproducing apparatus and said amplifier, the pivotal axis of said cover and amplifier being coincident with the axis of the exit portion of said fixed member and extending lengthwise of the exit portion of said amplifier, substantially as described.

4. In a phonograph or talking machine, the combination of a rotatable record support, a reproducer in operative relation thereto, a movable cover for said record support and reproducer, a movable sound conveying arm connected with said reproducer, a sound amplifier movable with said cover about an axis extending lengthwise of the exit portion of the amplifier, and a stationary sound conveying connection between said arm and said amplifier, said amplifier and sound conveying connection being of fixed length and in direct and uninterrupted communication during the opening and closing of said cover, substantially as described.

5. In a phonograph or talking machine, the combination of a horizontal record support, a reproducer in operative relation thereto, a plurality of sound amplifiers movable about substantially horizontal axes which are out of alinement with the axes of the exit portions of said amplifiers, and sound conveying means connecting all of said amplifiers with said reproducer, said sound amplifiers being in direct and uninterrupted communication with said sound conveying means during the movement of said amplifiers about said axes, substantially as described.

6. In a phonograph or talking machine, the combination of a record support, a reproducer in operative relation thereto, a plurality of covers for said reproducer and record support movable about spaced substantially parallel axes, each of said covers having a sound amplifier movable therewith, and sound conveying means connecting all of said amplifiers with said reproducer, substantially as described.

7. In a phonograph or talking machine, the combination of a record support, a reproducer in operative relation thereto, a plurality of movable covers for said reproducer, a sound amplifier movable with each cover and sound conveying means connecting all of said amplifiers with said reproducer, said sound amplifiers being in direct and uninterrupted communication with said

sound conveying means during the opening or closing of said covers, substantially as described.

5 8. In a phonograph or talking machine, the combination of a record support, a reproducer in operative relation thereto, a plurality of pivoted covers for said reproducer and record support, a sound amplifier movable with each cover, and sound conveying means connecting all of said amplifiers with said reproducer, the pivotal axis of each cover extending lengthwise of the exit portion of the amplifier movable with said cover, substantially as described.

10 9. In a phonograph or talking machine, the combination of a record support, a reproducer in operative relation thereto, a plurality of pivoted covers for said reproducer and record support, a sound amplifier movable with each cover, and sound conveying means connecting all of said amplifiers with said reproducer, the pivotal axis of each cover extending lengthwise of the exit portion of the amplifier movable with said cover, and being coincident with the axis of one of the exits of said sound conveying means, substantially as described.

15 10. In a phonograph or talking machine, the combination of record supporting means, sound reproducing means in operative relation thereto, a plurality of movable covers

for said sound reproducing means, sound amplifying means movable with each cover, and sound conveying means connecting said sound amplifying means with said sound reproducing means, said sound amplifying means being in direct and uninterrupted communication with said sound conveying means during the opening or closing of said covers, substantially as described.

40 11. In a phonograph or talking machine, the combination of sound reproducing apparatus comprising a reproducer, a pivoted cover for said sound reproducing apparatus, said sound reproducing apparatus being operative for both open and closed positions of said cover, and sound conveying means connected with said reproducer and comprising a sound amplifier movable with said cover, the pivotal axis of said cover extending lengthwise of the exit portion of said amplifier, and said sound conveying means being of fixed length and free from breaks or interruptions throughout its length during the opening and closing of the cover, substantially as described.

55 This specification signed and witnessed this 10th day of July 1913.

DELOS HOLDEN.

Witnesses:

FREDERICK BACHMANN,
MARY J. LAIDLAW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

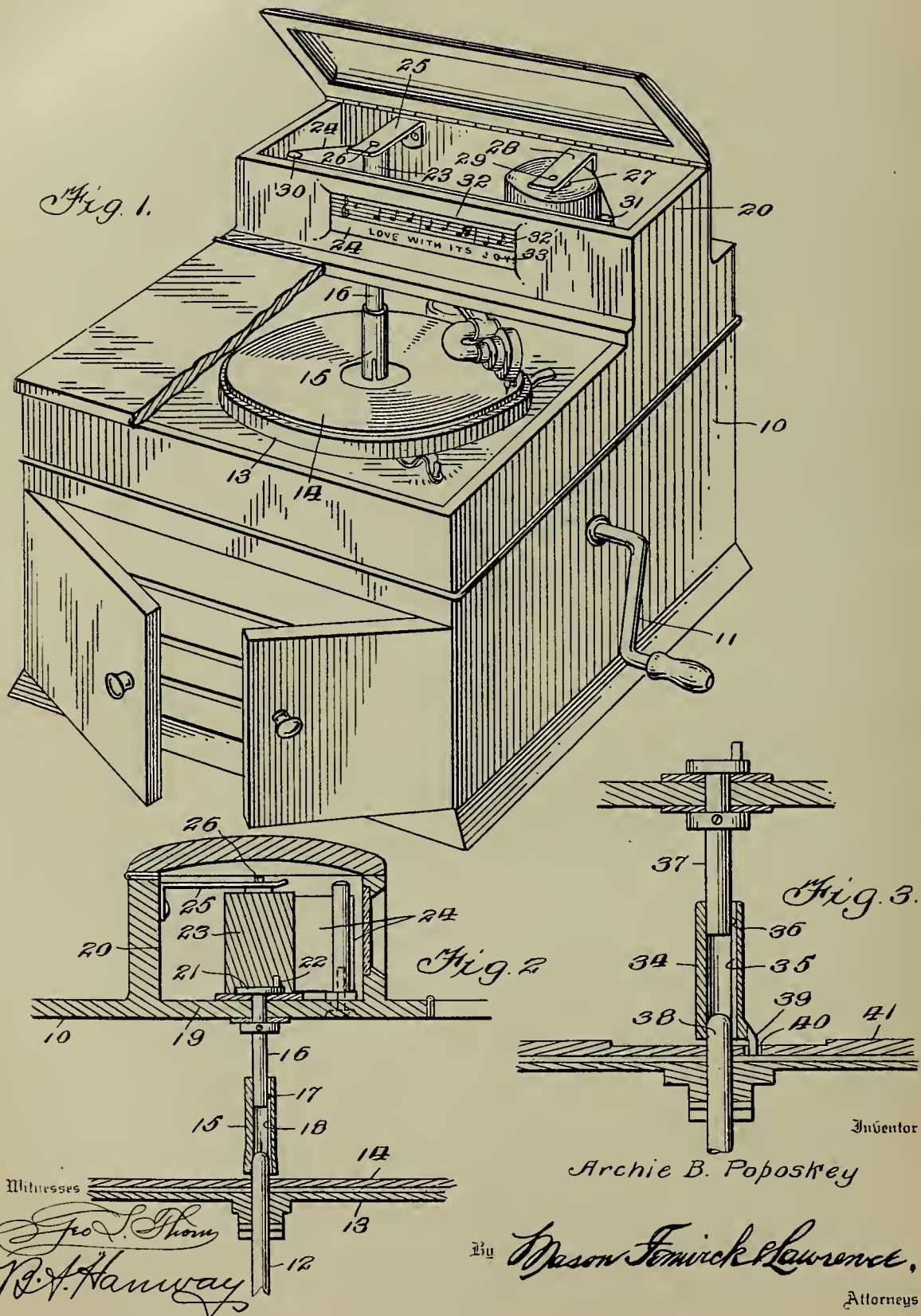
ATTACHMENT FOR MUSICAL INSTRUMENTS,

1,170,325-----A. B. POPOSKEY,
Patented-February 1st, 1916.
Filed-April 17th, 1915.

A. B. POPOSKEY.
ATTACHMENT FOR MUSICAL INSTRUMENTS.
APPLICATION FILED APR. 17, 1915.

1,170,325.

Patented Feb. 1, 1916.



UNITED STATES PATENT OFFICE.

ARCHIE B. POPOSKEY. OF NEW YORK, N. Y.

ATTACHMENT FOR MUSICAL INSTRUMENTS.

1,170,325.

Specification of Letters Patent.

Patented Feb. 1, 1916.

Application filed April 17, 1915. Serial No. 22,150.

To all whom it may concern:

Be it known that I, ARCHIE B. POPOSKEY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Attachments for Musical Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to attachments for musical instruments and the like and more particularly to an attachment for indicating a musical staff with words, moving scenes or any desired substitute therefor.

It has for an object to utilize mechanical movement from a musical instrument for imparting movement to a tape or its equivalent.

A further object of this invention is the provision of a simplified means for removably supporting said tape.

A further object of this invention is the provision of means for removably attaching a tape mechanism to a movable part of the musical instrument.

A further object of this invention is the provision of a means for moving a tape bearing a musical staff and words in synchronism with the musical record so that as the musical record is being played, the tape is moved to show the music and words of said record.

Further objects will be apparent from the following specification, appended claims and drawings thereof, in which—

Figure 1 is a perspective view of a musical instrument showing the device attached thereto, Fig. 2 is a vertical sectional view showing the operative mechanism for said tape and Fig. 3 is a similar view showing a modified form.

This invention is shown applied to a phonograph but it is understood that it may likewise be applied to any mechanical musical instrument with slight modifications in the connecting and driving mechanism.

Referring to the drawings, there are shown certain elements comprising a talking machine in which 10 indicates the cabinet having the winding crank 11, rotatable spindle 12 and turntable 13 upon which a record 14 may be placed. The spindle 12 extends

above the record 14 where it receives the lower end of a sleeve 15 in binding engagement therewith and this sleeve is slidable on the shaft 16 but imparts movement to said shaft from said spindle through a pin 17 and slot 18 formed on the shaft and in the sleeve respectively. The shaft 16 passes through the floor 19 of a housing 20 and said shaft has a head 21 formed thereon from which a pin 22 rises so that said head and pin engage a conforming recess in a spool 23 to which a tape 24 is connected. The spool 23 has its upper end supported by a spring 25 which engages the trunnion 26 so that by exerting upward movement of said spool, the spring 25 will yield when said spool may be removed from the housing 20. The spool 23 has one end of the tape 24 attached thereto while the opposite end of said tape is attached to a spool 27 which is likewise removably supported as by a spring 28 engaging the trunnion 29. The tape 24 may pass directly from the spool 27 to the spool 23 but when applied to an instrument of this character, the spool 23 will be located centrally over the instrument and in view thereof, it may be desired to cause the tape to pass about the pins 30 and 31 to expose a greater length of said tape through the window 32 formed in the front wall of the housing 20. This tape is shown in the drawing as having musical staff 32' formed thereon and the wording 33 printed below the musical staff. The lower end of the sleeve 15 may be split to permit said sleeve frictionally engaging the upper end of the spindle 12.

In Fig. 3 of the drawings, a modification of the sleeve 15 is shown in which the sleeve 34 has a key-way 35 to receive the pin 36 carried by the shaft 37 and in this type, the sleeve 34 receives the spindle 38 but has no frictional contact therewith. The sleeve has a depending pin 39 which engages in an aperture 40 formed in the record 41. As the aperture 40 in the record 41 serves to impart movement into the sleeve 34 and as the spool 23 has only one application upon the head 21, it is apparent that it is always possible to synchronize the tape 24 with the record 41.

It is thought that the operation of the device is clearly disclosed in the foregoing and that its application to musical instruments of different characters is evident as well as possible modifications to meet certain requirements.

Having thus described my invention, I claim:—

1. In a device of the class described, in combination with a phonograph having a driving spindle, a turn-table, a phonetic record carried by said turn-table, a moving tape, indications on said tape corresponding with the phonetic sounds from said record and positive connection between said phonetic record and said tape for actuating said moving tape in synchronism with said record.

2. In a device of the character described comprising in combination a phonograph having a driving spindle, a turn-table thereon, a phonetic record on said turntable, a moving tape bearing indications similar to the phonetic sounds from said record, a housing having a restricted visual opening for exposing a restricted portion of said moving tape, a detachable shaft having positive engagement with said musical record, said moving tape being detachably supported by said shaft and the indications on said tape being exposed through said visual opening in synchronism with the phonetic sounds of said musical record.

3. In a device of the character described, a driving shaft, a turntable carried thereby, a musical record detachably carried by said turntable, said musical record having a socket formed therein, a detachable shaft for engagement with said driving shaft and an offset carried by said detachable shaft for engagement in the socket formed by said musical record.

4. In a device of the class described, in combination, a driving shaft, a turntable carried thereby, a musical record carried by said turntable, said musical record having frictional contact with said turntable, a supplemental shaft in alinement with said driving shaft, said supplemental shaft having an irregular head carried thereby, a spool detachably carried by said irregular head and means for driving said supplemental shaft by positive engagement of a portion thereof with said musical record.

In testimony whereof I affix my signature in presence of two witnesses.

ARCHIE B. POPOSKEY.

Witnesses:

GEORGE L. THOM,
MAE PERRY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, AND EDWARD L. AIKEN, OF ORANGE,
NEW JERSEY, ASSIGNORS TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE,
NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS OF FORMING SOUND-RECORDS AND OTHER OBJECTS.

1,170,391.

Specification of Letters Patent.

Patented Feb. 1, 1916.

No Drawing.

Application filed August 6, 1910. Serial No. 575,981.

To all whom it may concern:

Be it known that we, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, Essex county, New Jersey, and EDWARD L. AIKEN, a citizen of the United States, and a resident of Orange, Essex county, New Jersey, have invented a certain new and useful Process of Forming Sound-Records and other Objects, of which the following is a description.

Our invention relates to a process of forming molded objects, especially flat plates, such as disk sound records, and also as an article of manufacture, to the disk sound record and other molded objects formed by our improved process. The said objects are claimed in a divisional application Serial No. 861,038, filed September 10, 1914.

Our invention, as to certain aspects thereof, is an improvement upon the invention disclosed in application of Jonas W. Aylsworth, Serial No. 543,236, entitled Sound records and process for making the same, filed February 11, 1910.

By our improved process, molded objects are formed of refractory condensation products of phenol or equivalent substances, and formaldehyde or other material containing the methylene radical CH_2 .

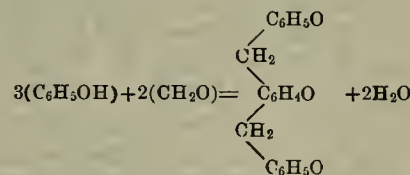
The object of our invention is the production of an efficient, thoroughly practical commercial process of the character described, in which the desired results may be attained quickly, surely, and with the least possible expense.

Our object is also to produce as an article of manufacture various molded objects such as disk sound records, formed by our improved process, and having certain distinguishing characteristics which will hereafter be more fully pointed out.

Our process consists generally in the formation of a body or backing having a large proportion of an inert filling material incorporated therein, the formation of a surfacing layer, having a less proportion of filler or no filler, securing or forming the surfacing layer upon the body, molding the object from the blank thus formed, while at the same time causing the reaction to ensue between the ingredients of the object or of the surface layer thereof by application

of sufficient heat to form a final infusible and insoluble condensation product.

In carrying out our process, we prefer to proceed as follows:—A fusible soluble phenolic condensation product or phenol resin is formed. This is preferably the product formed by the reaction of substantially three parts of phenol to two parts of formaldehyde by molecular weights, the reaction apparently taking place according to the equation—



as explained in the said application of Aylsworth, Serial No. 543,236, and also in applications of Aylsworth, Serial No. 496,060, filed May 14, 1909, entitled Plastic composition and process of manufacturing the same, and Serial No. 543,238, filed February 11, 1910, entitled Phenolic condensation product and method of preparing the same. Whether or not the reaction takes place according to the equation given, the resulting condensation product is fusible and soluble in alcohol and other solvents and is a solid at normal temperatures. Apparently, this product contains no free formaldehyde or other free or active methylene-containing substance, and it is permanently fusible in the sense that it cannot be transformed into an infusible final condensation product by any amount of heating with or without pressure without the addition of formaldehyde, paraformaldehyde, hexa-methylene-tetraamin, or other hardening agent, but upon being heated together with a sufficient quantity, as 10%, of such hardening agent, a transformation takes place changing the phenol resin into a final infusible insoluble condensation product, as is explained in the applications of Aylsworth above referred to. To make the blank or body of a disk sound record or other object to be molded, we prefer to dissolve the fusible condensation product or phenol resin obtained as above described in a liquid solvent for the same, preferably alcohol. A sufficient percentage of a methylene-containing or hardening agent is then dissolved in the solvent containing the phenol resin. We prefer to

make use of hexa-methylene-tetra-amin in the proportion of about 10 per cent. of the phenol resin, and this is preferably first dissolved in a sufficient amount of water and
 5 added to the solution of the phenol resin in the alcohol. since the hexa-methylene-tetra-amin dissolves more readily in water than in alcohol. Next, an inert filling body such as dry wood pulp or other filling materials,
 10 such as are described in the applications of Aylsworth above referred to, are placed in a mixing machine, and if desired, a coloring material, such as lamp black, is added to the mixture. The solution of the phenol resin
 15 and the hardening agent is then poured into the mixing machine upon the filler and the components are thoroughly mixed together. The solvent is then removed as by evaporation, the alcohol preferably being recovered
 20 and used over and over. The dried mixture resulting is then ground to uniformity and molded preferably in a hydraulic press with a suitable amount of heat, preferably about 300 degrees F., steam heat, the blank or body
 25 thus being formed. In this molding operation, the hardening reaction between the phenol resin and the hexa-methylene-tetra-amin may take place to a limited extent, although it is only necessary that the materials be sufficiently heated to coalesce in the
 30 mold to form the blank. The filling body may be used with good results in the proportion of two or three to one by weight to the phenol resin.

35 The surface layer for the object to be molded is preferably formed as follows:—A sufficient amount of phenol resin, together with a hardening material, preferably hexa-methylene-tetra-amin, a plasticity agent,
 40 such as described in the applications of Aylsworth above referred to, and which is preferably chlorinated naphthalene, as mono-chloro-naphthalene, are ground together, with a percentage of an inert filler
 45 less than the percentage used in the case of the mixture for the blank above described. Preferably, a percentage of the blank mixture itself is used for incorporation with the other ingredients to provide the filling
 50 body. We have obtained good results with the following proportions:

Phenol resin	100 parts.
Blank mixture	10 to 40 parts.
55 Mono-chloro-naphthalene	15 to 30 parts.
Hexa-methylene-tetra-amin	10 to 12 parts.

60 Preferably, the hexa-methylene-tetra-amin in perfectly dry condition is first ground through a paint mill together with the chlorinated naphthalene, which is rendered liquid if necessary by heat. This operation results in the formation of a paste. The phenol resin is then ground and the desired amount of the blank mixture stirred into the
 65 same after the grinding, together with the

paste containing the hexa-methylene-tetra-amin and the chlorinated naphthalene. A damp powder results. The mixture thus formed is preferably now subjected to a more uniform mixing operation by running
 70 the same between heated mixing rolls. The mixture is then preferably formed into sheets by passing the same through heated calender rolls, the heat of the rolls being sufficient to cause the formation of the sheet,
 75 but not to cause the reaction between the ingredients. The surface layer in the form of sheets is then fixed to the blank in any suitable manner. In the case of a plate to be molded, such as a disk sound record, the
 80 heated blank together with a surfacing sheet is passed between warm rolls. In the case of a disk sound record which it is desired to mold upon both sides, a surface layer is secured to each side of the blank by passing
 85 the heated blank with surfacing sheets on both sides of the same through the rolls. The blank is now ready to be molded and is placed in a suitable mold, heated sufficiently, and pressed preferably in a hydraulic press,
 90 the reaction ensuing between the ingredients of the composition while in the press to harden the molded object into a final infusible and insoluble product, such as is described in application of Aylsworth. Serial
 95 No. 543,236, above referred to, the body and the surface layer being one homogeneous mass. Upon cooling, the finished molded object may be removed from the mold.

100 We prefer to use hexa-methylene-tetra-amin as a hardening agent for reasons given in applications of Aylsworth. Serial No. 543,236 and 543,238, although para-formaldehyde or other methylene-containing substances may be used. During the final re-
 105 action, there is no evolution of dissociation gases, and counteracting pressure, accordingly, need not be used to prevent gassing in the composition, pressure being used only for the purpose of giving the object the de-
 110 sired form. In the case of various objects, it will not be necessary to perform the entire reaction within the mold during the shaping of the object, which may be transformed into its final infusible and insoluble
 115 form subsequently. In the case of various molded objects having exceedingly delicate surfaces, particularly sound records, the best result is attained by performing the final hardening reaction while the object is
 120 being pressed in the mold. The filling body used may be a final infusible phenolic hard condensation product ground fine and mixed with the other ingredients, in place of wood pulp or other organic or inorganic fillers.
 125 This is mentioned in applications of Aylsworth, Serial No. 543,236, above referred to, and Serial No. 575,970, filed Aug. 6, 1910.

It is obvious that our invention is not limited to the particular details described, but 130

that the latter may be modified within the scope of the appended claims without departing from the spirit of the invention. The body of the record or other object formed should upon molding make a homogeneous mass with the surface layer, to obtain the best results, but for some purposes the body may be formed of an inert filler and a binder other than a phenolic condensation product, particularly if the body is of material having substantially the same coefficient of expansion as the surface layer which in such case is in the nature of a veneer applied to the backing.

Having now described our invention, what we claim and desire to protect by Letters Patent is as follows:

1. The process of forming molded objects which consists in dissolving a permanently fusible phenolic condensation product in a liquid solvent therefor, mixing therewith an inert filling material, freeing the mass of the solvent, reducing the same to uniform powder, heating the same and molding the same to shape, substantially as described.

2. The process of forming molded objects which consists in dissolving a permanently fusible phenolic condensation product in a liquid solvent therefor, mixing therewith an inert filling material, freeing the mass of the solvent, heating the same and molding the same to shape, substantially as described.

3. The process of forming sound record blanks, which consists in dissolving a permanently fusible phenolic condensation product in a liquid solvent therefor, dissolving therein a sufficient quantity of a methylene containing substance to harden the mass upon subsequent bringing of the same to the reaction temperature, mixing therewith an inert filling material, freeing the mass of the solvent, reducing the same to a uniform powder, heating the same, and molding the same to shape, substantially as described.

4. The process of forming molded objects, which consists in making a blank comprising a phenolic condensation product, forming a surface layer comprising a mixture of a permanently fusible phenolic condensation product, and a methylene containing substance in sufficient quantity to harden the mass to an infusible product upon heat treatment, then applying the same to the surface of the blank, and then applying the object thus made to a suitable mold and molding the same with application of heat, substantially as described.

5. The process of forming molded objects, which consists in making a blank comprising an inert filling body and a binding agent, forming a surface layer comprising a mixture of a permanently fusible phenolic condensation product and a methylene containing substance in sufficient quantity to

harden the mass to an infusible product upon heat treatment, then applying the same to the surface of the blank, and then applying the object thus made to a suitable mold and molding the same with application of heat, substantially as described.

6. The process of forming molded objects, which consists in mixing together a permanently fusible phenolic condensation product, an inert filler, and a hardening agent, consolidating the ingredients to form a blank, forming a surface layer comprising a mixture of permanently fusible phenolic condensation product and a hardening agent, applying the same to the surface of the blank, and then pressing the object thus formed in a suitable matrix with application of heat sufficient to cause the ingredients to react and harden, substantially as described.

7. The process of forming molded objects, which consists in mixing together a permanently fusible phenolic condensation product, an inert filler, and a methylene-containing substance in sufficient quantity to harden the mass to an infusible product upon subsequent heat treatment, forming a blank thereof, forming a surface layer comprising a mixture of permanently fusible phenolic condensation product and a hardening agent, applying the same to the surface of the blank, and then pressing the object thus formed in a suitable matrix with application of heat sufficient to cause the ingredients to react and harden, substantially as described.

8. The process of forming molded objects, which consists in making a blank comprising a phenolic condensation product, forming a surface layer comprising a mixture of a permanently fusible phenolic condensation product and a methylene-containing substance in sufficient quantity to harden the mass to an infusible product upon subsequent heat treatment, applying the same to the surface of the blank, and then pressing the object thus formed in a suitable mold with application of heat sufficient to cause the ingredients of the surface layer to react and harden, substantially as described.

9. The process of forming molded objects, which consists in making a blank comprising a phenolic condensation product, forming a surface layer comprising a mixture of a permanently fusible phenolic condensation product and a methylene-containing substance in sufficient quantity to harden the mass to an infusible product upon subsequent heat treatment, applying the same to the surface of the blank, and heating the object thus formed sufficiently to cause the ingredients of the surface layer to react and harden, substantially as described.

10. The process of forming molded objects, which consists in making a blank comprising an inert filling body and a binding agent, forming a surface layer comprising

a mixture of a permanently fusible phenolic condensation product and a methylene-containing substance in sufficient quantity to harden the mass to an infusible product

5 upon subsequent heat treatment, then applying the same to the surface of the blank, and then pressing the object thus formed in a suitable mold with application of heat sufficient to cause the ingredients of the surface layer to react and harden, substantially as described.

11. The process of forming molded objects, which consists in making a blank comprising an inert filling body and a binding agent, forming a surface layer comprising 15 a mixture of a permanently fusible phenolic condensation product and a methylene-containing substance in sufficient quantity to harden the mass to an infusible product upon subsequent heat treatment, applying 20 the same to the surface of the blank, and heating the object thus formed sufficiently to cause the ingredients of the surface layer to react and harden, substantially as described.

12. The process of forming molded objects, which consists in making a blank comprising an inert filling body and a binding agent, forming a surface layer comprising 30 a mixture of a permanently fusible phenolic condensation product and a methylene-containing substance in sufficient quantity to harden and render infusible the mass upon subsequent heat treatment together with a 35 plasticity agent, applying the same to the surface of the blank, and heating the object thus formed sufficiently to cause the ingredients of the surface layer to react and harden, substantially as described.

13. The process of forming molded objects, which consists in making a blank comprising an inert filling body and a binding agent, forming a surface layer comprising 40 a mixture of a permanently fusible phenolic condensation product and a methylene-containing substance in sufficient quantity to harden and render infusible the mass upon subsequent heat treatment together with a 45 plasticity agent, and a quantity of an inert filling body in less proportion than is used in the blank, then applying the same to the surface of the blank, and then pressing the object thus formed in a suitable mold with application of heat sufficient to cause the ingredients of the surface layer to react and 50 harden, substantially as described.

14. The process of forming molded objects, which consists in making a blank comprising an inert filling body and a binding agent, forming a surface layer comprising 60 a mixture of a fusible phenolic condensation product, sufficient hexa-methylene-amin to harden and render infusible the mass upon subsequent heat treatment, together with 65 chlorinated naphthalene in the proportion of

10% to 40% of the weight of the said fusible product, applying the same to the surface of the blank, and heating the blank thus formed sufficiently to cause the ingredients of the surface layer to react and harden, 70 substantially as described.

15. The process of forming molded objects, which consists in making a blank comprising an inert filling body and a binding agent, forming a surface layer comprising 75 a mixture of a permanently fusible phenolic condensation product and a methylene-containing substance in sufficient quantity to harden and render infusible the mass upon subsequent heat treatment together with a 80 plasticity agent, and a quantity of the composition of said blank in the proportion of less than half of the amount of said fusible product, by weight, then applying the same to the surface of the blank, and then pressing 85 the blank thus formed in a suitable mold with application of heat sufficient to cause the ingredients of the surface layer to react and harden, substantially as described.

16. The process of forming molded objects, which consists in making a blank comprising an inert filling body, a permanently fusible phenolic condensation product, and a methyleneating agent therefor, forming a surface layer thereon comprising a mixture 90 of the said blank mixture with a greater quantity of the fusible phenolic condensation product, a methyleneating agent and a plasticity agent, and heating sufficiently to cause the ingredients to react and the object 100 be transformed into hard infusible product, substantially as described.

17. The process of forming molded objects, consisting in molding a blank comprising an inert filling body and a binding agent, forming a surface layer thereon comprising a permanently fusible phenolic condensation product and a methylene-containing substance and pressing in a mold while 110 applying heat sufficient to cause the ingredients of the surface to react and form a hard infusible product, substantially as described.

18. The process of forming molded objects consisting in molding a blank comprising an inert filling body and a binding agent, forming a surface layer thereon comprising a permanently fusible phenolic condensation product and a methylene-containing substance and a plasticity agent, and pressing in a mold while applying heat sufficient 120 to cause the ingredients of the surface to react and form a hard fusible product, substantially as described.

19. The process of forming flat plates consisting in forming a surfacing material comprising a fusible phenolic condensation product and a methylene containing substance, applying the same to a backing plate by passing the plate and a sufficient quantity 125 of the material through hot rolls, and heating 130

ing the plate thus formed sufficiently to cause the ingredients of the surface to react to form a hard infusible product, substantially as described.

5 20. The process of forming flat plates, consisting in forming a surfacing material comprising a fusible phenolic condensation product and a methylene-containing substance, forming a thin sheet of the same, 10 and applying to a backing plate by passing the plate and sheet together through heated rolls, substantially as described.

21. The process of forming molded objects, which consists in making a blank comprising an inert filling body and a binding agent, forming a surface layer comprising a mixture of a permanently fusible phenolic condensation product, a methylene containing substance in sufficient quantity to harden the mass to an infusible product upon 20 heat treatment, and a plasticity agent, applying the surface layer to the surface of the blank, and then molding the blank with application of heat in a suitable matrix, substantially as described. 25

22. The process of forming molded objects which consists in dissolving a permanently fusible phenolic condensation product in a liquid solvent therefor, mixing wood 30 pulp therewith, freeing the mass of the solvent, reducing the same to uniform powder, heating the same, and molding the same to shape, substantially as described.

23. The process of forming molded objects which consists in dissolving a permanently fusible phenolic condensation product in a liquid solvent therefor, mixing wood

pulp therewith, freeing the mass of the solvent, heating the same, and molding the same to shape, substantially as described. 40

24. The process of forming sound record blanks, which consists in dissolving a permanently fusible phenolic condensation product in a liquid solvent therefor, dissolving therein a sufficient quantity of a 45 methylene containing substance to harden the mass upon subsequent bringing of the same to the reaction temperature, mixing wood pulp therewith, freeing the mass of the solvent, reducing the same to a uniform 50 powder, heating the same, and molding the same to shape, substantially as described.

25. The process of forming molded objects, which consists in mixing together a permanently fusible phenolic condensation 55 product and an agent capable of reacting chemically with said condensation product to form an infusible phenolic condensation product, consolidating the said ingredients to form a blank, applying to the blank thus 60 formed a thermo-plastic surface layer, and transforming said blank with application of heat into said infusible product, substantially as described.

This specification signed and witnessed 65 this 30th day of July, 1910.

JONAS W. AYLSWORTH.

Witnesses:

DYER SMITH,
DELOS HOLDEN.

EDWARD L. AIKEN.

Witnesses:

DYER SMITH,
FRANK D. LEWIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH PATENT.

FIGURE TOY ATTACHMENT FOR DISK PHONOGRAPHS,
1,170,427-----G. A. D'Oench,
Patented-February 1st, 1916.
Filed-August 9th, 1915.

G. A. D'OENCH.
FIGURE TOY ATTACHMENT FOR DISK PHONOGRAPHS.
APPLICATION FILED AUG. 9, 1915.

1,170,427.

Patented Feb. 1, 1916.

Fig. 4.

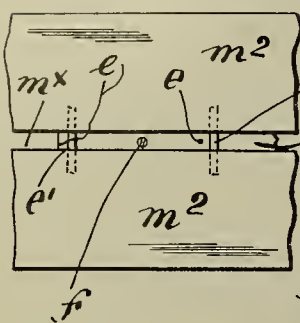


Fig. 1.

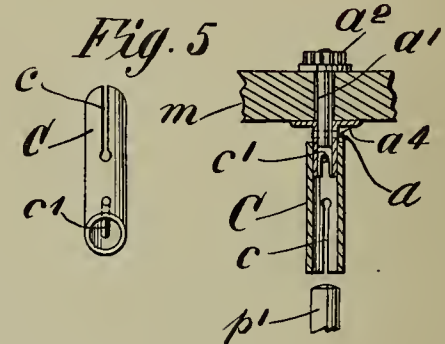
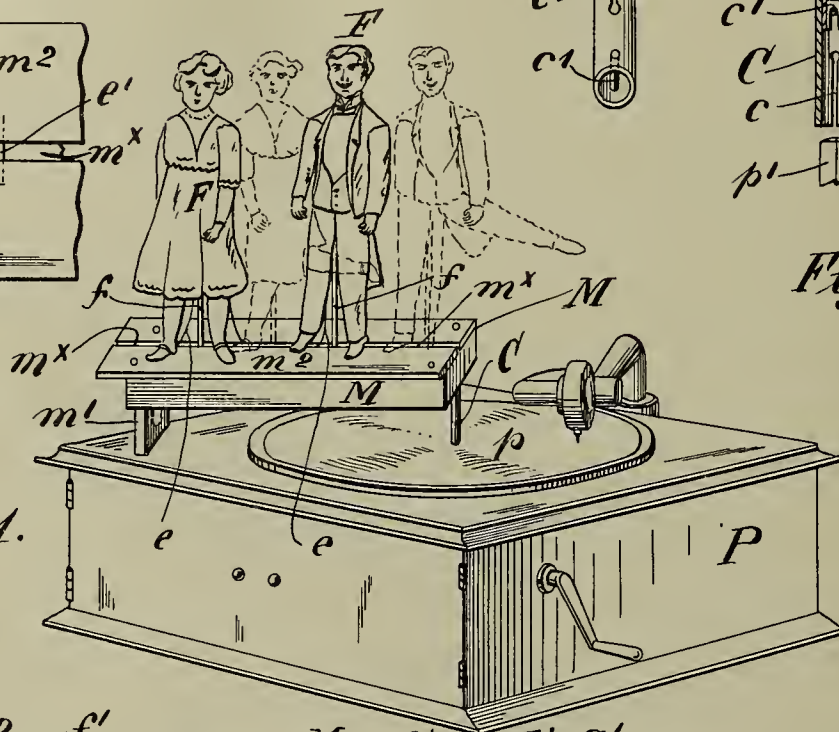
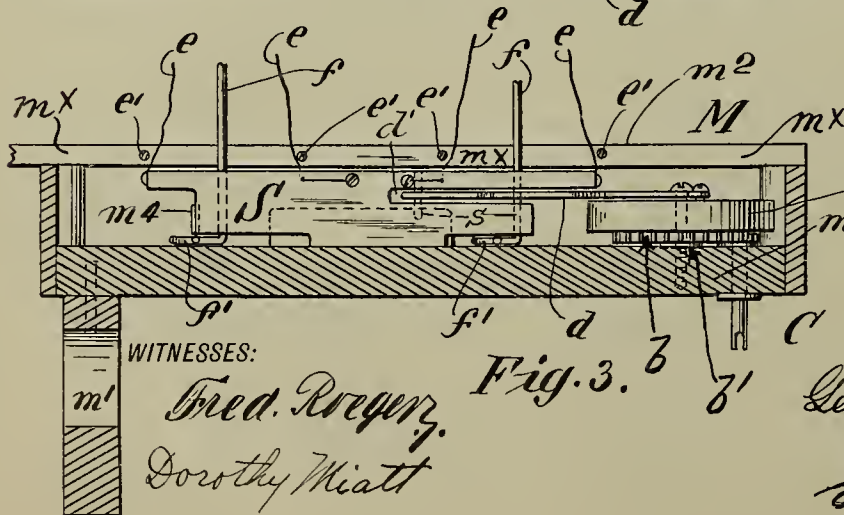
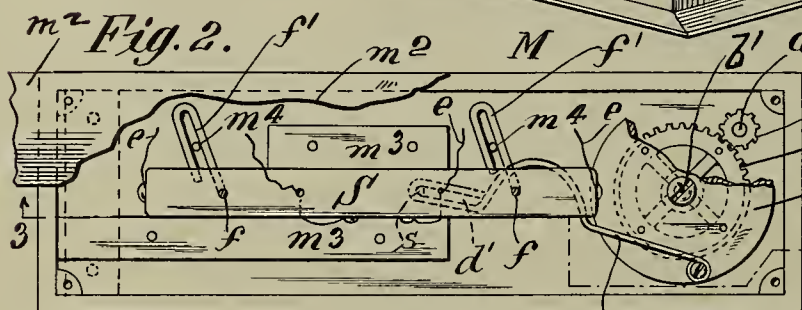


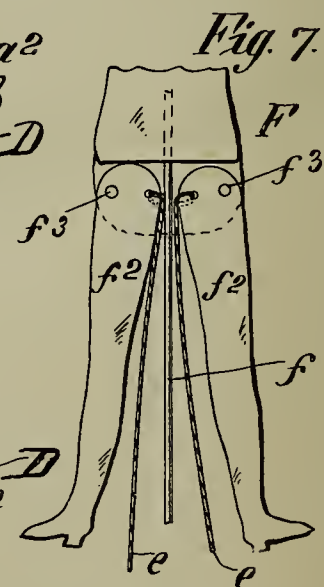
Fig. 6.



WITNESSES:

Fred. Reger.
Dorothy Miatt

Fig. 3.



INVENTOR

George A. D'Oench

BY

Geo. H. Miatt
ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE A. D'OENCH, OF NEW YORK, N. Y.

FIGURE-TOY ATTACHMENT FOR DISK PHONOGRAPHS.

1,170,427.

Specification of Letters Patent.

Patented Feb. 1, 1916.

Application filed August 9, 1915. Serial No. 44,415.

To all whom it may concern:

Be it known that I, GEORGE A. D'OENCH, a citizen of the United States, and a resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Figure-Toy Attachments for Disk Phonographs, of which the following is a specification.

My invention relates to the class of phonographs in which record disks are used for the reproduction of sounds, particularly those of a vocal and musical character, and is designed to afford an illusive effect whereby one or more marionettes appear to sing, dance, or act in unison with the music emanating from the sound-producing mechanism as hereinafter more fully set forth.

In the accompanying drawings, Figure 1, is a perspective view illustrating in a general way the practical application of my invention in connection with a disk-type of phonograph; Fig. 2, is a top view of the mechanism chest with various parts broken away to show the operative parts more clearly; Fig. 3, is a longitudinal section of the mechanism chest taken upon plane of line 3—3, Fig. 2; Fig. 4, is a detail view of adjoining portions of the chest cover showing the longitudinal slot and the cross bars for engaging the marionette strings; Fig. 5, is a perspective view of the coupling tube for engagement with the spindle of the record table of the phonograph; Fig. 6, is a sectional detail showing the means of transmitting motion to the operative parts in the mechanism chest; Fig. 7, a detail view showing the manipulating cords connected with a marionette.

In the aforesaid drawings P, represents a phonograph of any kind or manufacture of the disk-record type,—*p*, being the record table rotatable in the ordinary manner and provided as usual with a central spindle *p'*, accessible from above. For engagement with this phonograph table spindle *p'*, I provide a coupling sleeve C, the lower portion of which is preferably split, as at *c*, to insure close fit and frictional contact with said spindle *p'*. The upper portion of this coupling sleeve C, is provided with an internal shoulder or cross bar *c'*, for engagement with the slotted or bifurcated end of a stud tube *a*, attached to the lower end of a pinion stud *a'*, which is mounted in and extends through the bottom *m*, of the mech-

anism chest M, and has rigidly attached to its upper extremity the actuating pinion *a*². By this or equivalent means motion is borrowed and transmitted from the phonograph table spindle *p'*, to the operative parts within the mechanism chest M, and obviously various well known mechanical expedients may be employed for this purpose, so that I do not limit myself in this respect to the identical form and construction of transmitting parts shown,—the essential feature in this respect being a coupling adapted to engage with and connect the phonograph table spindle *p'*, and the stud of the actuating pinion *a*², in such manner that the motion of the table spindle *p'*, is transmitted to the actuating pinion *a*², substantially as herein set forth.

The upper end of the stud tube *a*, is preferably flanged as at *a*⁴, to bear against the under side of the floor *m*, of the mechanism chest M, as shown in Fig. 6, so that the pinion stud *a'*, is held in position against longitudinal movement by said flange *a*⁴, and the pinion *a*², itself. In any case, no matter how the motion transmitting parts may be modified in structure, the coupling sleeve C, will constitute a support for the inner end of the mechanism chest M,—the outer end of the latter beyond the rotatable table *p*, being supported by a leg or brace *m'*, adapted to rest against the top of the phonograph box P, which brace *m'*, may be made detachable from the bottom *m*, of the chest to facilitate packing and transportation. The mechanism chest M, is elongated in shape, and its cover *m*², constitutes, in appearance, a platform for one or more marionette figures F, which however are in fact supported each, on a standard rod *f*, pivotally mounted in a slide S, resting on the floor of the chest and between parallel guides *m*³, *m*³ secured to said floor, as shown more particularly in Fig. 2. The lower end of each standard rod *f*, also rests on the floor of the chest, M, and is formed with a slotted foot of lateral extension *f'*, which straddles a pin or stud *m*⁴, projecting upward from the floor of the chest as seen in Fig. 2. Hence, when the slide S, is reciprocated back and forth between the guides *m*³, *m*³ each standard rod *f*, will be partially turned upon its longitudinal axis, first in one direction and then in the other, thereby turning the marionette partly around from side to side, alternately in opposite direc-

tions, while moving it back and forth along the platform or cover m^2 ,—the latter being formed with the longitudinal slot m^x , to admit of this play of the standard rods f , and the under side of the slide S, being recessed as shown in Fig. 3, to admit of the play of the foot extension f' .

Each standard rod f , f' , may be conveniently and cheaply made of metallic wire, and any appropriate figure, doll, or manikin, may be mounted upon the upper extremity thereof. In the arrangement shown in the drawings two standard rods f , and two marionettes F, are provided, although it is obvious that any number of figures may be provided for, by a simple extension and duplication of certain parts.

The reciprocation of the slide S, is effected by means of a pitman rod d , pivotally connected with said slide S, and with a disk D, rigidly attached to a cog wheel b , meshing with the actuating pinion a^2 ,—said disk D, and cog wheel b , turning upon a stud b' , mounted in the floor of the chest M. The slide end of the pitman d , is made into a loop d' , forming a longitudinal slot through which passes the pivotal pin s , on the slide S. Thus the latter is allowed a period of rest at the termination of its stroke in either direction and prior to the reversal of reciprocal movement, so that the marionettes will also come to rest for a short period prior to reversal of direction of movement or travel. Obviously the pitman rod d , might be pivotally connected directly with the cog wheel b , with like effect,—the intermediate disk D, in the arrangement shown in the drawings being provided to space and position the pitman rod d , with relation to the upper portion of the slide S, which is recessed to accommodate said rod. The latter is also shown as bent laterally to clear one of the standard rods f ,—but these features are only incidental to the structure shown in the drawings. The relative diameters of the actuating pinion a^2 , and the cog wheel b , may be varied as may be found most expedient in adapting the device and the motions of the figures to harmonize with the requirements of the music with which they are designed to be associated. Thus, for a song and dance "team" such as represented in the drawings, a difference of four to one is desirable, equivalent to the usual timing of song and dance music. And where the device is to be used in connection with the latter class of music, I prefer to actuate the lower limbs of the marionettes in conformity to the music. This I accomplish by pivotally connecting the lower limbs f^2 , of each manikin to its body portion eccentrically as illustrated at f^3 , f^3 , in Fig. 7, and attaching manipulating cords, strings or equivalent flexible connections e , e , opposite said pivots f^3 , as also shown in said

Fig. 7. These flexible connections e , e , extend downward through the longitudinal slot m^x , in the cover m^2 , of the chest M, and between bars e' , e' , extending across said slot m , the other extremities of these flexible connections being secured at appropriate places to the slide S,—sufficient slack being allowed to provide for the rest periods. As a result, at or near the termination of each reciprocatory stroke of the slide S, in either direction one or the other of the limbs of each figure F, will be raised in time with the music, and an illusive effect produced. And in the case of song and dance music if the observer is sufficiently remote from the figures they will seem to be singing as well as dancing to the music.

In Fig. 1, of the drawings the marionettes are shown in continuous lines as in the intermediate position, and in dotted lines as at the termination of the inward stroke of the slide S. Obviously if desired the arms of the figures might be articulated and manipulated in like manner, so that I do not confine myself in this respect to the manipulation of the leg limbs,—the essential feature being the manipulation of limbs of marionettes in the manner set forth.

What I claim as my invention and desire to secure by Letters Patent is,

1. An attachment for phonographs of the character designated, comprising a slide, means for reciprocating the same by motion derived from the spindle of the rotatable record table of the phonograph, a marionette supporting rod pivotally mounted on said slide and formed with a slotted lateral extension straddling a fixed stud, and said fixed stud, whereby the marionette as carried back and forth by the slide is made to partially turn alternately in opposite directions, substantially as and for the purpose set forth.

2. An attachment for phonographs of the character designated, comprising a slide, means for reciprocating the same by motion derived from the spindle of the rotatable record table of the phonograph, a marionette supporting rod pivotally mounted on said slide, a marionette mounted on said rod and formed with pivotally attached limbs, flexible connections, one attached to each of said pivoted limbs and to the said slide, and stationary contacts arranged to engage said flexible connections during the reciprocation of the slide, whereby the limbs are actuated, substantially in the manner and for the purpose herein set forth.

3. An attachment for phonographs of the character designated, comprising a slide, means for reciprocating the same by motion derived from the spindle of the rotatable record table of the phonograph, a marionette supporting rod pivotally mounted on said slide and formed with a slotted lateral

extension straddling a fixed stud, said fixed stud, a marionette mounted upon said supporting rod and formed with pivotally attached limbs, flexible connections, one attached to each of said pivoted limbs and to the slide, and stationary contacts arranged to engage said flexible connections during the reciprocation of the slide, whereby the marionette as it is moved back and forth is made to partially turn alternately in opposite directions and whereby its limbs are actuated substantially in the manner and for the purpose set forth.

4. An attachment for phonographs of the character designated, comprising a slide upon which is mounted a marionette, and means for reciprocating said slide by motion derived from the spindle of the rotatable record table of the phonograph, consisting of a coupling sleeve fitting upon said record table spindle and formed for engagement with the interlocking end of a pinion stud, a cog gear meshing with said

pinion, and a pitman rod pivotally connected with said cog gear and with said slide, whereby the reciprocation of the slide with relation to the music may be prescribed by the relative difference in the diameters of the said pin and cog wheels, substantially as set forth.

5. An attachment for phonographs of the character designated, comprising a slide upon which is mounted a marionette, and means for reciprocating said slide by motion derived from the spindle of the rotatable record table of the phonograph consisting of a coupling sleeve fitting upon said record table spindle and formed for engagement with the interlocking end of a gear stud, and a pitman rod pivotally connected to the said slide and actuated by the rotation of said gear, for the purpose described.

GEORGE A. D'OENCH.

Witnesses:

DOROTHY MIATT,

GEO. WM. MIATT.

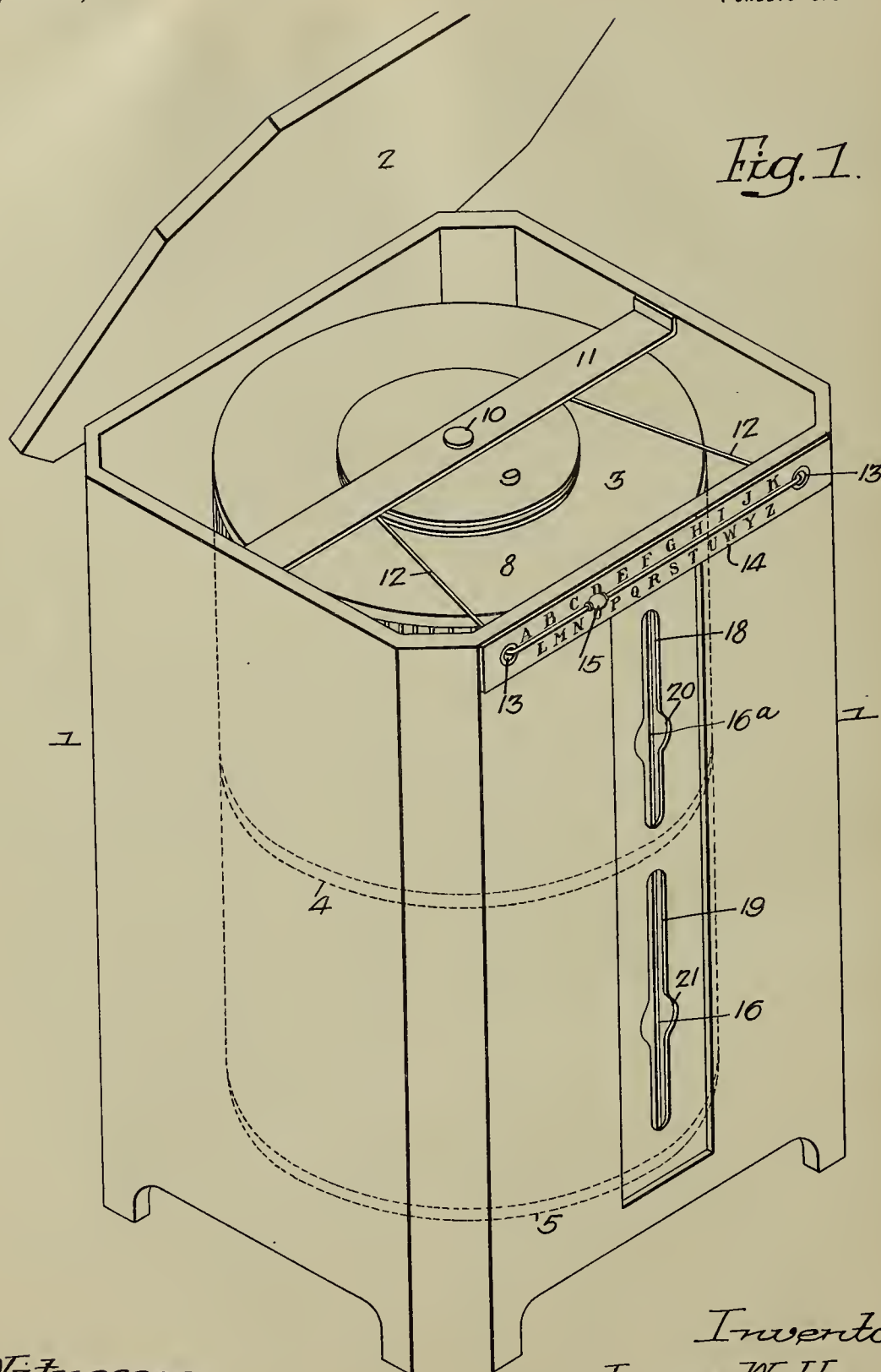
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

RECORD HOLDER,
1,170,447-----J. W. HUGHES,
Patented-February 1st, 1916.
Filed--January 18th, 1915.

J. W. HUGHES.
 RECORD HOLDER.
 APPLICATION FILED JAN. 18, 1915.

Patented Feb. 1, 1916.
 4 SHEETS—SHEET 1.

1,170,447.



Witnesses—
 Walter Chism
 M. A. Cunora

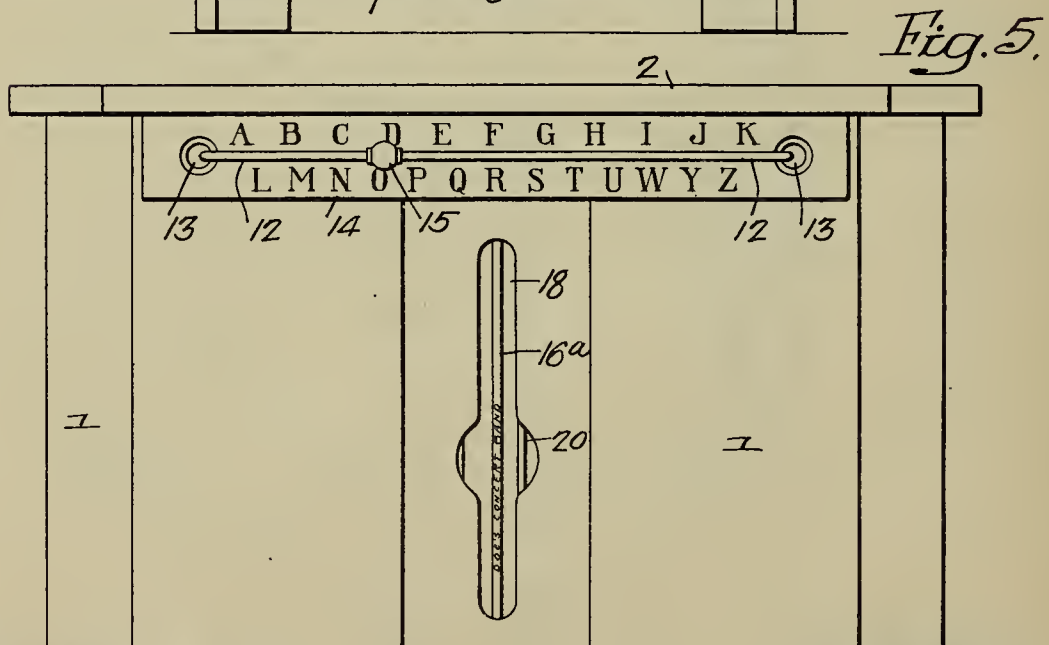
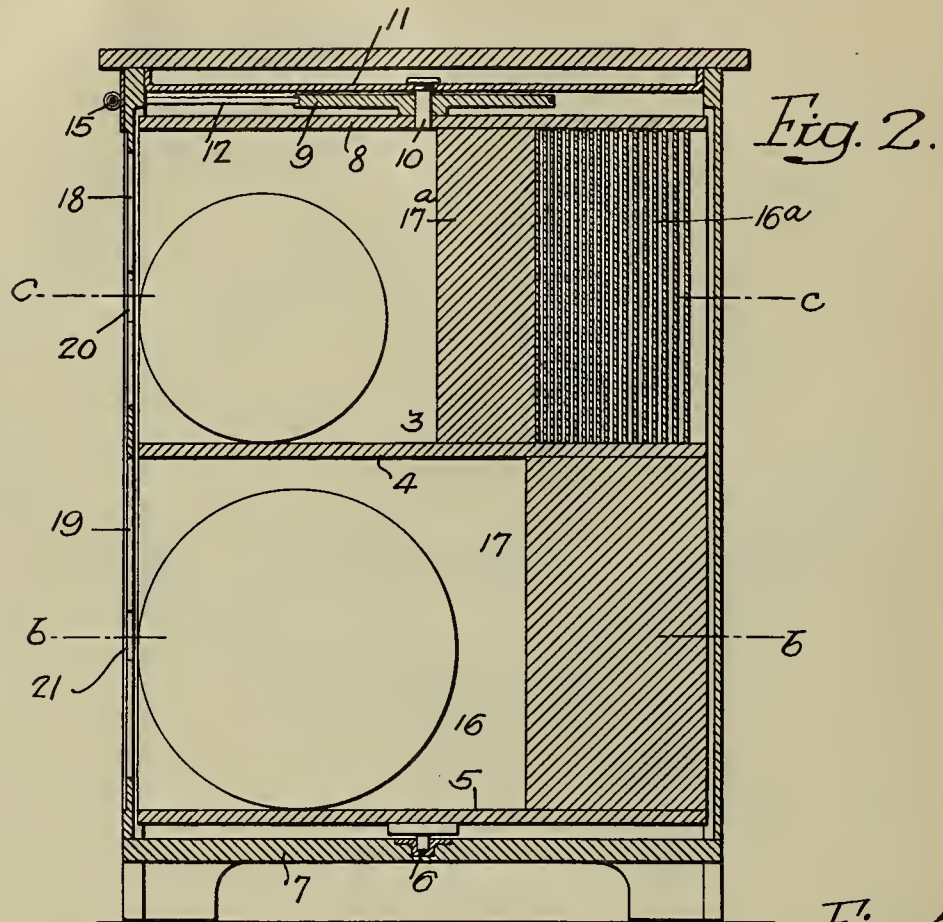
Inventor—
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 by his Attorneys,
 Howard Hanson

J. W. HUGHES.
 RECORD HOLDER.
 APPLICATION FILED JAN. 18, 1915.

1,170,447.

Patented Feb. 1, 1916.

4 SHEETS—SHEET 2.



Witnesses—
 Walter Chism
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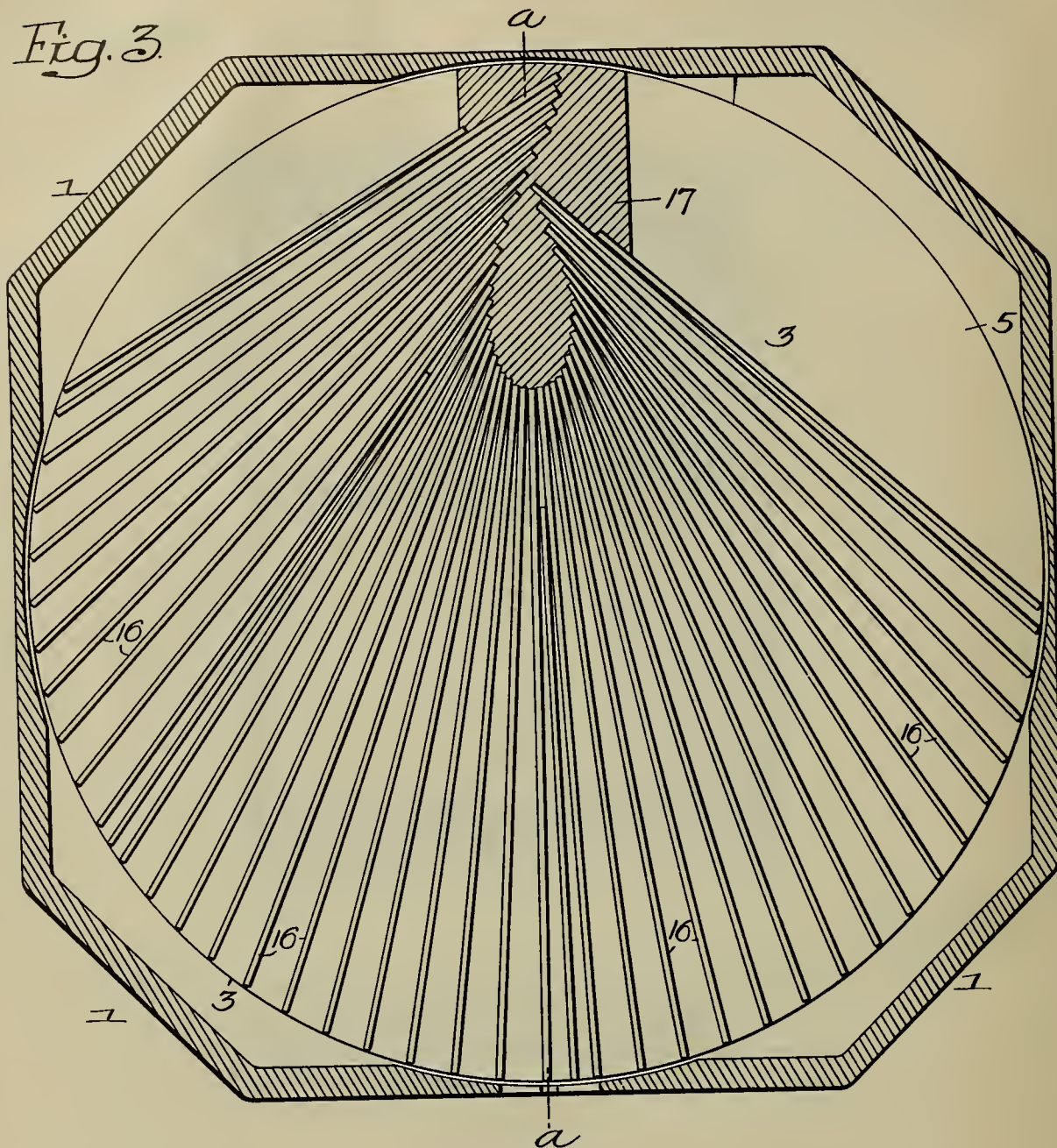
Inventor—
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 by his Attorneys—
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J. W. HUGHES.
RECORD HOLDER.
APPLICATION FILED JAN. 18, 1915.

Patented Feb. 1, 1916.
4 SHEETS—SHEET 3.

1,170,447.

Fig. 3.



Witnesses.—

Walter Chism

Mills & Burrows.

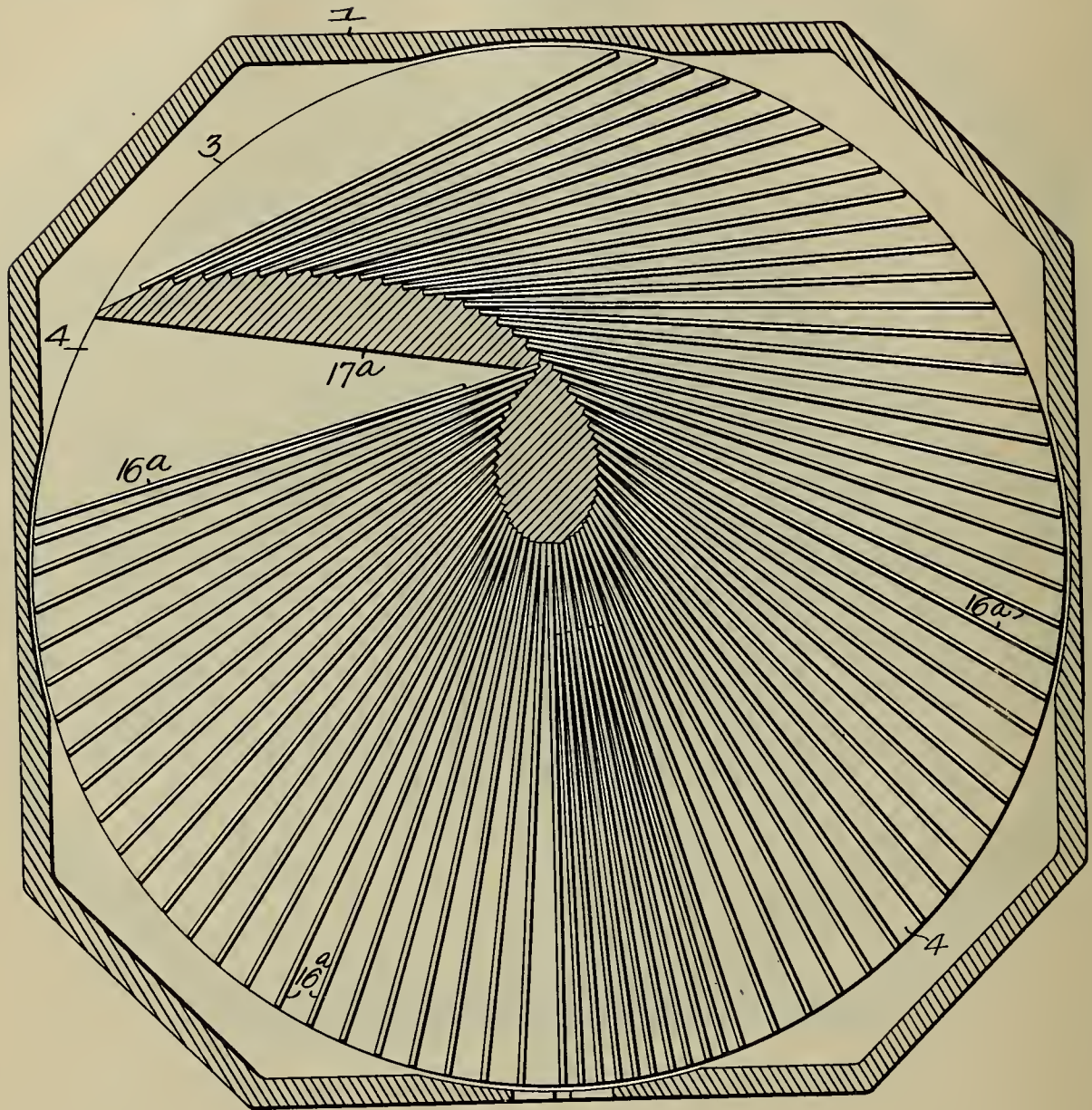
Inventor—
James W. Hughes.
by his Attorneys—
Howard Brown

J. W. HUGHES.
RECORD HOLDER.
APPLICATION FILED JAN. 18, 1915.

1,170,447.

Patented Feb. 1, 1916.
4 SHEETS—SHEET 4.

Fig. 4



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Inventor—
James W. Hughes
by his Attorneys:
Howson & Son

UNITED STATES PATENT OFFICE.

JAMES W. HUGHES, OF NARBERTH, PENNSYLVANIA.

RECORD-HOLDER.

1,170,447.

Specification of Letters Patent.

Patented Feb. 1, 1916.

Application filed January 18, 1915. Serial No. 2,960.

To all whom it may concern:

Be it known that I, JAMES W. HUGHES, a citizen of the United States, and a resident of Narberth, county of Montgomery, State of Pennsylvania, have invented certain Improvements in Record-Holders, of which the following is a specification.

My invention relates to certain improvements in holders for records of talking machines.

The invention is an improvement on the holder described and claimed in an application for patent filed by me on the 11th day of August 1914, under Serial No. 856,277.

One object of my invention is to design the record holder so that it can be located within a comparatively small cabinet and yet will accommodate a large number of records of different sizes.

A further object of the invention is to design the record holder so that the holder can be rotated to bring any record, to be removed from the cabinet, in line with the openings.

These objects I attain in the following manner, reference being had to the accompanying drawings, in which:—

Figure 1, is a perspective view of my improved record holder cabinet with the top raised; Fig. 2, is a vertical sectional view on the line *a—*a**, Fig. 3; Fig. 3, is a sectional plan view on the line *b—*b**, Fig. 2; Fig. 4, is a sectional plan view on the line *c—*c**, Fig. 2; and Fig. 5, is a front view of the upper portion of the cabinet.

Referring to the drawings, 1 is the body of the cabinet made in any suitable manner; the cabinet, in the present instance, being square with the corners beveled.

2 is the top of the cabinet hinged so that it can be raised to insert or remove the record holder 3. This record holder is mounted in the cabinet 1, as shown in Fig. 1, and has an upper and a lower series of receptacles for the records, separated by a partition 4, illustrated by dotted lines, Fig. 1.

The lower end 5 of the holder is in the form of a disk and has a pivot pin 6 projecting therefrom mounted in any suitable bearing in the bottom 7 of the cabinet. The upper end 8 of the holder is also in the form of a disk and secured to this end of the holder is a grooved wheel 9. The upper end of the holder has a pin 10 adapted to a bearing bar 11 secured to the sides of the cabinet. A cord 12 passes around the wheel 9 and

through openings 13 in the cabinet and across a plate 14 which may be provided with indicating marks such as shown, if desired. Secured to the cord is a handle 15 in the form of a ball and by moving this handle transversely the holder can be turned and, when the ball is opposite a given mark, a certain record is in position to be removed.

16 is a series of vertical partitions extending, in the present instance, from the bottom 5 of the holder to the partition 4 and from the partition 4 to the top 8 of the holder. These partitions do not radiate from the center of rotation of the holder, but from a point some distance from the center of rotation, as clearly shown in Figs. 3 and 4, and rest against an abutment 17 shaped in the peculiar manner shown in Figs. 3 and 4, so that all of the partitions will be substantially the same length and the spaces between the partitions will all be of a greater length than the distance from the center of rotation to the periphery of the holder, in order to accommodate a greater number of large records in a comparatively small cabinet.

In Fig. 3, I have shown the abutment 17 at a greater distance from the center of rotation than the abutment 17^a, Fig. 4, and the abutment 17 is so formed that the partitions 16 are of a greater length than the partitions 16^a, Fig. 4, and, consequently, the spaces between the partitions 16, Fig. 3, are of a greater length than the spaces between the partitions 16^a, Fig. 4. The arrangement illustrated in Fig. 3 is preferably for large records, whereas the arrangement illustrated in Fig. 4 is preferably for small records, as a greater number can be contained in the cabinet constructed as shown in Fig. 4 than in the cabinet constructed as shown in Fig. 3, and both constructions accommodate a larger number of records than if the partitions radiated from a common center.

At the front of the cabinet, in the present instance, are two slots 18 and 19. The upper slot 18 is of sufficient length to allow for the removal of the smaller disk records from the upper series of spaces, and the slot 19 is located so as to allow for the removal of the larger records from the lower series of spaces as illustrated in Fig. 3. The wall of each slot is notched, as at 20 and 21, respectively, to allow the fingers to grasp a record as it is moved opposite the slot, as illustrated in Fig. 5. I preferably make the slots of suffi-

cient width that the name of the record can be carried by one of the partitions, and by moving the holder by means of the cord 12 the name of the record can be readily ascertained before the record is removed from the cabinet.

It will be understood, by the above construction, that I am enabled to locate a greater number of large sized records than heretofore in a comparatively small cabinet.

It will be understood that while I have described the holder as having two sets of partitions, one located above the other, the cabinet may be made with a single set of partitions, either in the form illustrated in Fig. 3, or as illustrated in Fig. 4, according to the size of the record and the size of the cabinet.

While I have illustrated the invention as particularly adapted for holding disk records of a talking machine, it will be understood that it can be used to hold other narrow and flat objects, either round or of other shapes, without departing from the essential feature of the invention.

I claim:—

1. The combination in means for holding disk records, consisting of a holder having a series of partitions forming compartments arranged to receive the records, the partitions radiating from a spiral line.

2. A holder for disk records consisting of a casing; a cylindrical holder mounted on a

vertical pivot and located within the casing, said holder having a series of partitions spaced apart to form compartments, the partitions radiating from a spiral line at one side of the center of rotation of the holder, the casing having an opening at the side through which any of the disks located in the compartments can be removed.

3. Means for holding disk records consisting of a cylindrical holder having a series of partitions forming compartments arranged to receive records, the partitions radiating from a line located at one side of the center of rotation of the cylindrical holder.

4. A record holder having vertical pivots on which it is turned, said holder having two sets of receptacles for the records, one mounted above the other; a horizontal partition; and vertical partitions extending from each side above and below the horizontal partition, said vertical partitions radiating from a spiral line at one side of the center of rotation of the holder, the vertical partitions of one set being of a greater length than those of the other set.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JAMES W. HUGHES.

Witnesses:

WM. A. BARR,
JOS. H. KLEIN.

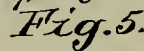
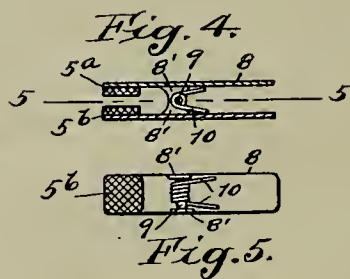
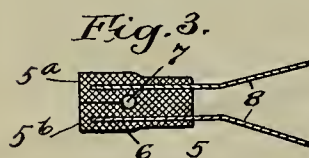
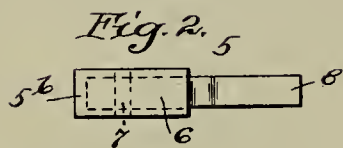
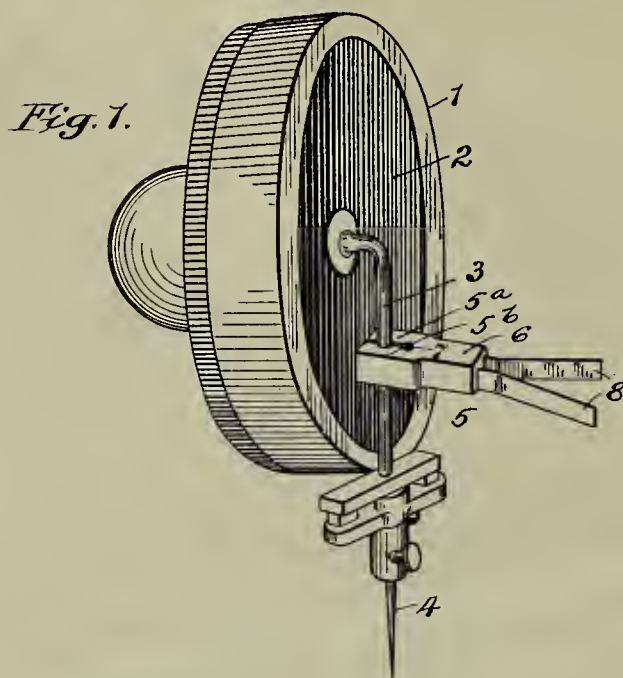
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

METHOD OF REGULATING SOUND BOX REPRODUCTION,
#1,170,530-----E. Gruenfeldt,
Patented-Feb. 8th, 1916.
Filed-Jan. 8th, 1915.

E. GRUENFELDT.
METHOD OF REGULATING SOUND BOX REPRODUCTION.
APPLICATION FILED JAN. 8, 1915.

1,170,530.

Patented Feb. 8, 1916.



Witnesses

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Geo. B. Pitts

Inventor

Emil Gruenfeldt.

By

Edward A. Alexander

Attorney

UNITED STATES PATENT OFFICE.

EMIL GRUENFELDT, OF CLEVELAND, OHIO.

METHOD OF REGULATING SOUND-BOX REPRODUCTION.

1,170,530.

Specification of Letters Patent.

Patented Feb. 8, 1916.

Application filed January 8, 1915. Serial No. 1,239.

To all whom it may concern:

Be it known that I, EMIL GRUENFELDT, a subject of the Emperor of Germany, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in and Relating to Methods of Regulating Sound-Box Reproduction, of which the following is a specification.

10 This invention relates to an improved method for regulating the operation of a sound box or reproducer for a phonograph or like instrument.

The object of my invention is to provide a method whereby the operator, merely by engaging resiliently the needle arm of a sound box with a regulating mass and moving the same to and fro therealong between the points of connection of said needle arm with the diaphragm and the sound box frame, is able to regulate the essential co-action of the parts to obtain the reproductive effect desired.

For the purpose of illustration I have, in the accompanying drawing, shown and herein described examples of regulators for sound boxes embodying my invention.

Figure 1 is a perspective view of a sound box for a phonograph or like instrument to which is applied a regulator embodying my invention. Fig. 2 is a side elevation of the regulator. Fig. 3 is a longitudinal sectional view of the regulator. Fig. 4 is a longitudinal vertical section illustrating a regulator embodying my invention but of slightly different form. Fig. 5 is a view on the line 5—5 of Fig. 4.

In the drawings, 1 represents, as an entirety, a sound box or reproducer of standard construction, 2 a diaphragm thereof, 3 a needle arm and 4 the needle.

5 indicates as an entirety one of my improved regulators. It is adapted to be fitted to the needle arm intermediate the diaphragm and the needle socket of the needle arm and to be adjusted therealong to give the desired effect to the sound reproduction. Preferably my regulator consists of a pair of resilient jaws 5^a, 5^b, which are resiliently pressed toward each other in any suitable manner, the jaws themselves being adapted to engage the needle arm. In Figs. 1, 2 and 3, the jaws 5^a, 5^b, are formed integral with a rubber head 6 which may be molded or formed in any suitable manner. The rubber piece 6 is formed with a hole 7

through it at the end of the line separating the inner walls of the jaws 5^a, 5^b, so as to preclude tearing apart of the piece 6 along the line of the faces of the jaws 5^a, 5^b. In fact, these faces may be formed by making a cut through the piece 6 from the hole 7 to the end thereof.

8, 8 are operating arms for the jaws 5^a, 5^b. They may be incorporated in the piece 6 when it is molded or may be inserted and held in position in any suitable manner.

In Figs. 4 and 5, a modified form of construction is shown in which the arms 8 have lateral extensions 8' pivotally connected together by a pivot 9. 10 is a spring surrounding the pivot 9 and having its ends bearing against said arms 8 respectively. Each of the jaws 5^a, 5^b, of resilient material is suitably secured to one end of one of the arms 8 respectively, the spring 10 serving normally to press the jaws 5^a, 5^b in engagement with each other.

In operation one of my improved regulators is placed upon the needle arm of the sound box or reproducer by separating the jaws 5^a, 5^b and the regulator is moved up and down along the needle arm from the periphery of the diaphragm to its center in order to regulate the sound reproduction as desired. The nearer to the center of the diaphragm which the resilient jaws engage the needle arm, the softer will be the results produced while the farther from the center of the diaphragm the regulator is adjusted the louder will be the effective reproduction.

It will be noted that the regulator is of simple, cheap and durable construction, and that it may be readily and quickly fitted to the needle arm and adjusted therealong.

It will be understood that the weight of the regulator as an entirety is a factor in the obtaining of the desired coöperative results between the regulator, needle arm and diaphragm, and that this weight may be proportioned accordingly to get the desired results. The resilient nature of the jaws 5^a, 5^b, is important in respect to the muffling of the sound reproduced and the avoidance of mechanical noises between the regulator and the needle arm, which would undoubtedly serve largely to defeat the purposes of the device.

To those skilled in the art many alterations in construction and widely differing embodiments and applications of my invention will suggest themselves, without de-

parting from the spirit and scope thereof. My disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

5 What I claim is:—

10 The method of regulating the reproduction of sound from a sound box, which consists in engaging resiliently a regulating mass with the needle arm of said sound box between its point of connection with the diaphragm and its point of connection with

the sound box frame, and moving said regulating mass to and fro along said needle arm between its said points of connection to effect the reproduction desired.

15

In testimony whereof I affix my signature, in the presence of two witnesses.

EMIL GRUENFELDT.

Witnesses:

GEO. B. PITTS,

EDWARD R. ALEXANDER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SPRING BARREL FOR TALKING

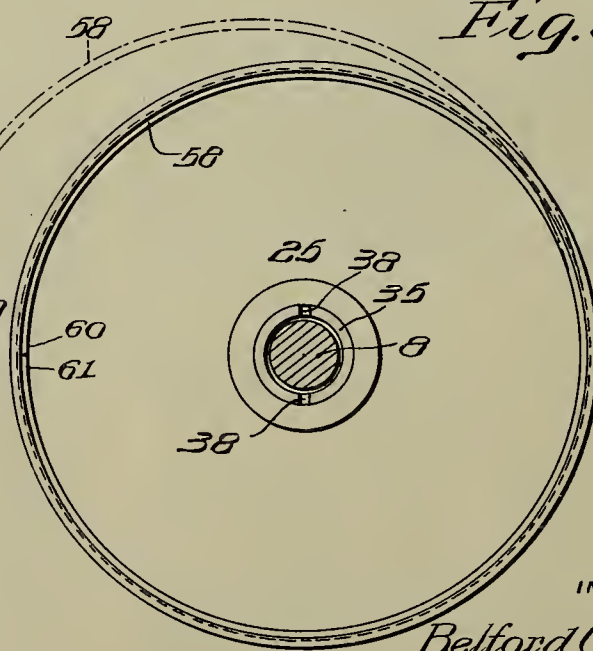
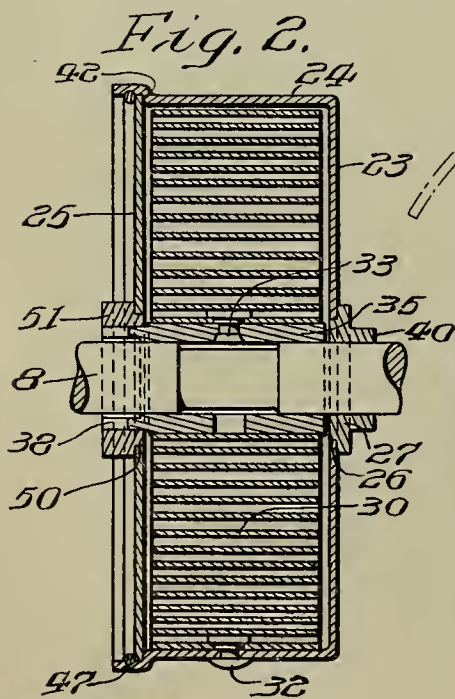
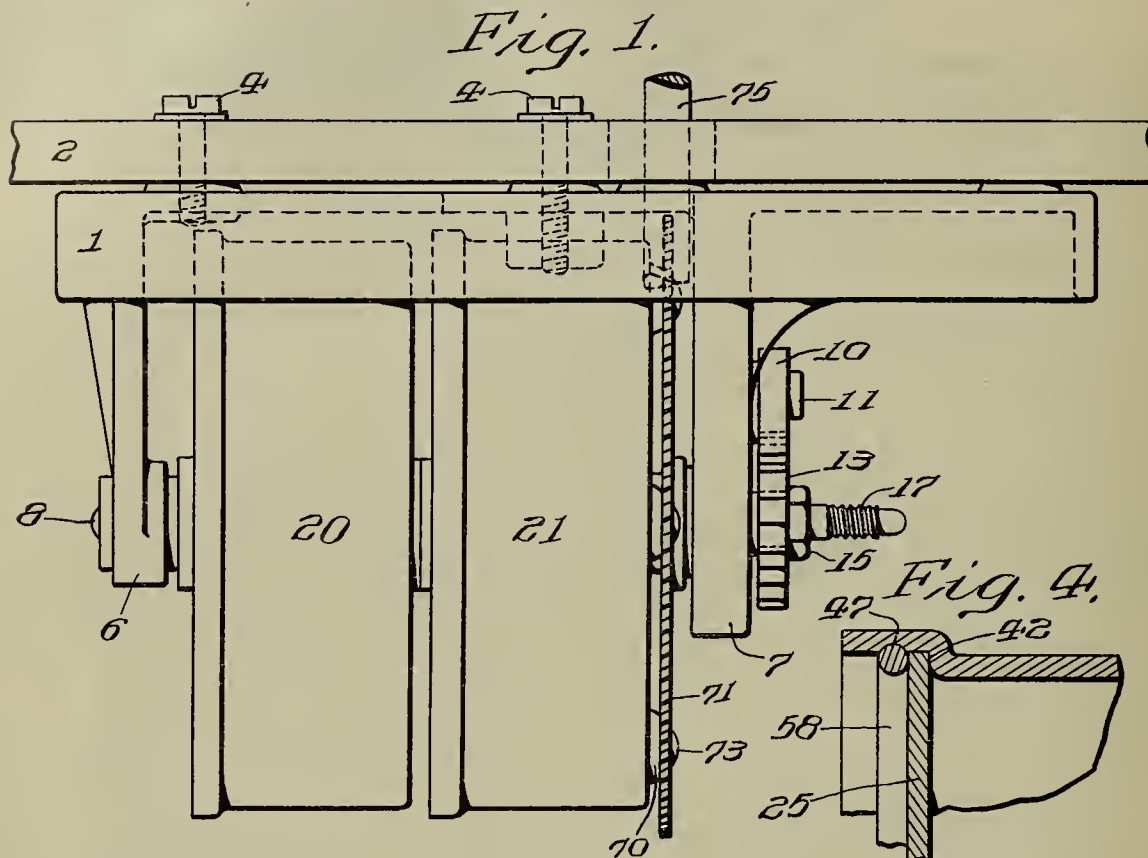
MACHINE MOTORS,

#1,170,675-----B. G. Royal,
Patented-Feb. 8th, 1916.
Filed-March 16th, 1914.

B. G. ROYAL.
 SPRING BARREL FOR TALKING MACHINE MOTORS.
 APPLICATION FILED MAR. 16, 1914.

1,170,675.

Patented Feb. 8, 1916.



WITNESSES
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Emory N. Keller.

INVENTOR
Belford G. Royal.
 BY *Horace C. Bell*
 ATTORNEY

UNITED STATES PATENT OFFICE.

BELFORD G. ROYAL, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SPRING-BARREL FOR TALKING-MACHINE MOTORS.

1,170,675.

Specification of Letters Patent.

Patented Feb. 8, 1916.

Application filed March 16, 1914. Serial No. 824,918.

To all whom it may concern:

Be it known that I, BELFORD G. ROYAL, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Spring-Barrels for Talking-Machine Motors and the like, of which the following is a specification, reference being had to the accompanying drawing.

10 In the spring barrels at present in use it is customary to maintain the head in position within the body of the barrel solely by the friction of the edge of the head against the interior of the body. This method is open
15 to numerous objections, among which may be mentioned the tendency of the head to become loosened within the body, thus causing a rattle; the frequent disalignment of the head whereby undue friction upon the
20 main shaft of the motor is set up, and interference with the operation of the motor caused by the head working loose or becoming disaligned and rubbing against the bottom of the adjacent barrel. In addition to
25 these disadvantages may be mentioned the difficulty of withdrawing the head from the body of the barrel without the use of special tools, and the liability of any lubricant, which may be contained in the barrel, leaking
30 past the edge of the head, if the latter becomes loosened in the body.

Among the principal objects of my invention are to provide improved means for maintaining the head of a spring barrel,
35 suitable for use in spring motors for talking machines or the like, in fixed relation with the barrel body while permitting, when desired, the ready and quick removal of the head from the body; to provide improved
40 means of this character which shall prevent the head from getting out of alinement with the body; and to provide means for maintaining the head in position in the body, which will permit the removal of the
45 head therefrom without the use of special tools.

Further objects of my invention are to provide improved means for maintaining the head in position in a spring barrel suitable
50 for use in motors for talking machines and the like, which shall be simple and cheap to construct; which may be easily manipulated by one unfamiliar with mechanical devices, and which may be employed in

spring barrels suitable for use in talking machine motors as at present constructed.

My invention further includes all of the various other novel objects and features of construction and arrangement hereinafter more definitely specified.

Referring to the drawing, Figure 1 thereof, is a side elevation of a spring motor suitable for use in a talking machine or the like in which spring barrels, embodying one form of my invention are employed; Fig. 2
65 is a central vertical section of one of the barrels removed from the motor showing the spring contained within the barrel together with its attendant parts, as well as a portion of the main shaft of the motor
70 in elevation; Fig. 3 is an end elevational view of a similar spring barrel; and Fig. 4 an enlarged, fragmentary, vertical section of a portion of the barrel showing certain details of my invention hereinafter described.

The motor, shown in Fig. 1, may consist of a frame 1, which may be attached to a portion 2 of the cabinet of a talking machine by means of suitable screws 4 passing
80 through the cabinet and threaded into suitable apertures in the frame. Depending from the frame are the brackets 6 and 7 suitably positioned thereon to support the main shaft 8, and provided with suitably
85 disposed apertures in which the said shaft may be journaled. On the outside of bracket 7 may be pivoted a suitable pawl 10 by means of a pivot 11 rigidly attached to the bracket, the teeth of the pawl engaging a
90 ratchet wheel 13 suitably attached to the main shaft and preferably fixedly secured thereto by means of the locknut 15 in the usual manner. Threads 17 formed upon the
95 projecting end of the main shaft may be provided for the attachment of a winding crank, not shown, by which the main shaft may be rotated in one direction, its rotation in the other direction being prevented by the engagement of the pawl 10 with the
100 teeth of the ratchet wheel 13.

Mounted upon the main shaft 8, preferably in a manner hereinafter described, may be located a plurality of spring barrels 20 and 21, two barrels being illustrated in
105 the type of motor shown in the drawing although any number of barrels desired may be employed. Each barrel may pref-

erably consist of a cylindrical cup-shaped body having a bottom 23 and side 24 the body being preferably drawn from a suitable sheet of metal, and a flat circular head 25.

Centrally located in the bottom 23 may be provided a suitable circular aperture for the reception of a cylindrical flange 26 offset from the collar 27, this flange being of a diameter to form a very snug fit within the aperture, within which it may preferably be frictionally retained. The collar 27 may be formed in any desired shape depending upon the method by which the spring barrels are designed to be attached to each other when assembled in the motor, such method of attachment however forming no part of the present invention, and may be provided with a central cylindrical aperture of a suitable diameter to form a nice working fit upon the main shaft 8, as clearly shown in Fig. 2.

Within the spring barrel body may be located the flat helical spring 30, the outer end of which is preferably attached to the inside of the body by means of a rivet 32, the inner end being attached by means of a similar rivet 33 to a cylindrical sleeve 35 having a central aperture also forming a good working fit upon in the main shaft 8. The sleeve 35 may preferably be of such length that one end, when the sleeve is in position within the barrel as shown in Fig. 2, will be adjacent the inner end of the collar 27 and the other end will project somewhat beyond the head 25. This latter end may be provided with suitable recesses 38 operative to engage with suitable dogs 40 formed upon the collar 27 of an adjacent barrel, or the end of the sleeve may be formed in any other desired manner depending upon the method of attachment used between the several spring barrels when the motor is assembled.

At the open end of the body the diameter may be somewhat increased, preferably by forming a suitable offset in the sides 24 so that a shoulder 42 is formed upon the inside of the body, against which the head 25, which may preferably consist of a flat circular plate of a diameter approximately equal to that of the interior of the offset portion of the body, may rest, the offset portion being preferably of such length that it will extend somewhat beyond the head 25 when the latter is in position as clearly shown in Figs. 2 and 4.

In the center of the head 25 may be located a suitable circular aperture for the reception of the flange 50 offset from the collar 51 and frictionally retained within the aperture in a manner similar to that hitherto described in reference to the collar 27, this collar 51 having a central cylindrical aperture of a somewhat larger diameter than the main shaft 8 and suitable for the reception

of the projecting end of the sleeve 35. At a suitable distance from the shoulder, depending upon the thickness of the head 25, a peripheral groove 47 may preferably be formed upon the inside of the offset portion of the body in which a split ring 58, preferably formed of spring wire or other similar material, is adapted to engage. This ring may preferably be of a size and diameter to be readily sprung into and engage within the groove 47 best shown in Fig. 4, in which position the ends of the ring 60 and 61 will be in approximate contact as shown in Fig. 3. In this figure is also shown in broken lines a portion of the ring just before it is completely sprung into place within the groove 47, the rest of the ring having been already introduced into place within the groove.

The method of assembling the spring barrels with their attendant parts is as follows: The collars 27 and 51, having been affixed respectively to the body of the barrel and to the head thereof in any desired manner, the ends of the spring may be attached to the inside of the body and to the outside of the sleeve 35 by means of the rivets 32 and 33 whereby the spring will be retained in position within the barrel. The head 25 may now be placed in the offset portion of the body, in which position it rests against the shoulder 42 and the spring ring 58 forced into place within the groove 47, in which position it will bear against the surface of the head as shown in Fig. 4. The spring barrels now may be slipped upon the main shaft 8 and the motor itself assembled in the usual manner.

If desired, one of the spring barrels may be provided with a plurality of bosses 70 upon its bottom extending outwardly therefrom and adapted to support the worm wheel 71 which may be suitably attached to the bosses by rivets 73 or otherwise. This worm wheel is adapted to engage with a suitable worm, not shown, formed upon the driving shaft 75 which may extend upwardly through the frame 1 and also through the cabinet 2 in the well-known manner.

It will be evident that in a spring barrel embodying my invention, the head 25, will be fixedly retained in position within the body portion of the barrel, and will always maintain a parallel relation with the bottom 23 thereof whereby the apertures in the collars attached respectively to the head 25 and to the bottom 23 will always be maintained in exact alinement, thereby permitting the main shaft 8 to rotate freely in said apertures. Moreover, there will be no danger of the head becoming displaced within the body in such manner that it may drag against the bottom of the adjacent spring barrel during the operation of the motor. On the other hand, when it is desired to re-

move the spring from the barrel for the purpose of repairs or replacement, the same can be readily accomplished by one not skilled in the use of tools merely by forcing
 5 the spring ring 58 out of the groove 47 by means of some suitable instrument, such as a screw-driver, after which the head 25 may readily be removed. Furthermore, if it be
 10 desired to fill the spring barrel with a liquid or other lubricant for the purpose of increasing the efficiency of the motor, the same may be readily done without danger of the contents leaking out, since at all times the head will be held tightly in position against
 15 the shoulder 42 whereby any leakage of liquid or other material contained within the barrel is prevented.

I do not desire to limit myself to the exact details of construction and arrangement
 20 of the various parts of that form of my invention which I have illustrated and described herein, as it will be evident that various changes may be made in the details of the device without departing from the spirit
 25 and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

30 1. A spring barrel for a talking machine motor or the like comprising a cup-shaped body portion, a circular head and a split ring, said ring being operative to maintain said head within said body portion.

35 2. A spring barrel for a talking machine motor or the like comprising a cup-shaped body portion having a shoulder formed upon its interior, a circular head adapted to rest against said shoulder, and a split
 40 ring operative to engage the interior of said body portion adjacent said head.

3. A spring barrel for a talking machine motor or the like comprising a cup-shaped body portion having a groove formed upon
 45 its interior, a circular head adapted to fit within said body portion and a split ring operative to engage within said groove.

4. A spring barrel for a talking machine motor or the like comprising a cup-shaped
 50 body portion having an offset adjacent its open end, a shoulder upon the interior of said body, a circular head adapted to rest against said shoulder, and a split ring operative to engage within said body portion
 55 adjacent said head.

5. In a spring barrel for a talking machine motor or the like the combination with a cup-shaped body portion having a periph-

eral groove upon its interior adjacent its open end, and a shoulder formed upon the
 60 interior of said body portion, of a circular head adapted to rest against said shoulder and a spring ring adapted to engage said groove and operative to maintain said head
 65 against said shoulder.

6. In a spring barrel for a talking machine motor or the like, the combination with a body portion, of a flat helical spring coiled within said body portion, a sleeve, a collar in permanent relation with said body
 70 portion, a head, a collar in permanent relation with said head and forming a bearing for one end of said sleeve, and a spring ring operative to engage within said body portion, one end of said helical spring being
 75 fixedly attached to said body portion and the other end of said helical spring being similarly attached to said sleeve.

7. In a spring barrel for a talking machine motor or the like, the combination
 80 with a cup-shaped body, the diameter thereof being increased adjacent its open end and having an interior, peripheral groove, of a circular head adapted to engage within the enlarged portion of said body, a helical
 85 spring coiled within said body, a sleeve axially disposed therein, one end of said spring being attached to said sleeve and the other end to said body, and a split spring ring adapted to engage within said groove to
 90 maintain said head within said body.

8. In a spring barrel for a talking machine motor or the like, the combination with a body portion having an offset adjacent its open end, of a head adapted to en-
 95 gage within said body portion and means expandible in a plane normal to the central longitudinal axis of said body portion operative to maintain said head within said
 100 body portion.

9. In a spring barrel for a talking machine or the like, the combination with a cup-shaped body portion having an offset adjacent its open end provided with an interior annular groove, of a circular head op-
 105 erative to engage within said offset, and means expandible in a plane normal to the central longitudinal axis of said body portion operative to engage within said groove.

In witness whereof, I have hereunto set
 110 my hand this 12th day of March, A. D. 1914.

BELFORD G. ROYAL.

Witnesses:

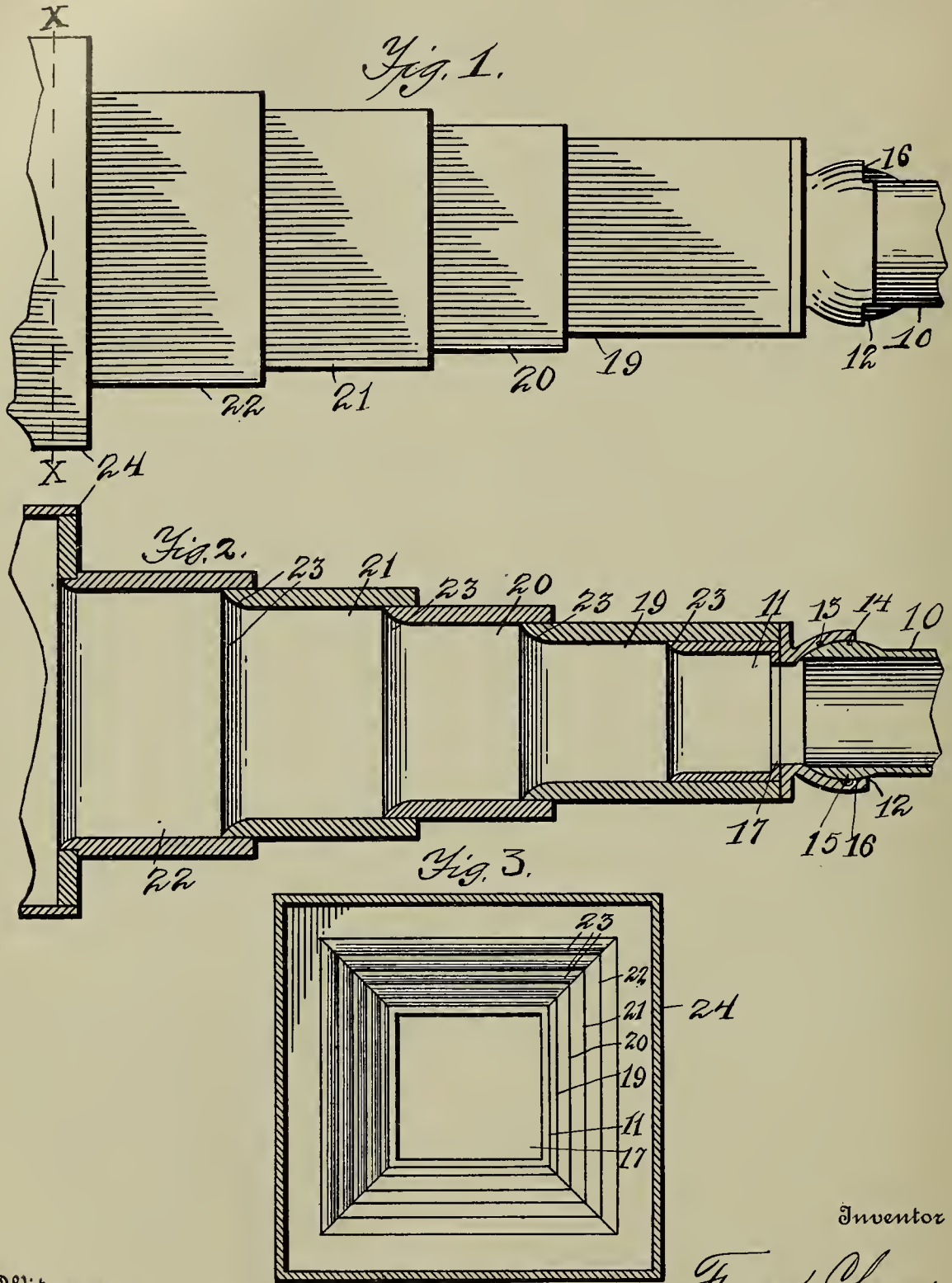
JAMES W. OWEN,
 CHARLES F. WILLARD.

ORIGINAL HERE
SOUND RESONATOR AND AMPLIFIER,
1,170,800-----F. Cheney,
Patented-Feb. 8th, 1916.
Filed-Mar. 11th, 1912.
Renewed--Nov. 26th, 1915.

F. CHENEY.
SOUND RESONATOR AND AMPLIFIER.
APPLICATION FILED MAR. 11, 1912. RENEWED NOV. 26, 1915.

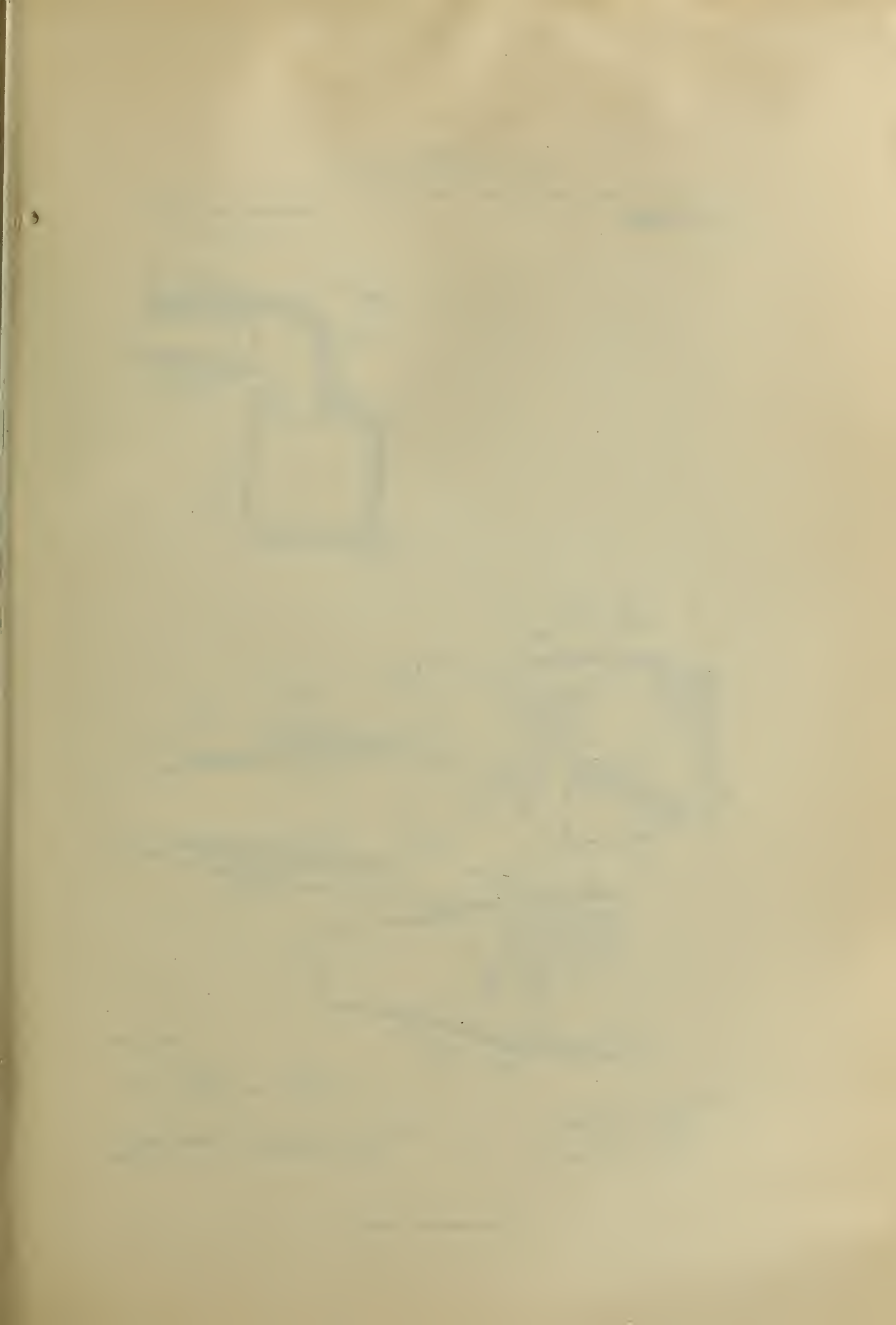
1,170,800.

Patented Feb. 8, 1916.
3 SHEETS—SHEET 1.



Witnesses
Arthur O. Morse
H. U. Harris

Inventor
Forest Cheney
By S. Arthur Baldwin
Attorney



F. CHENEY.

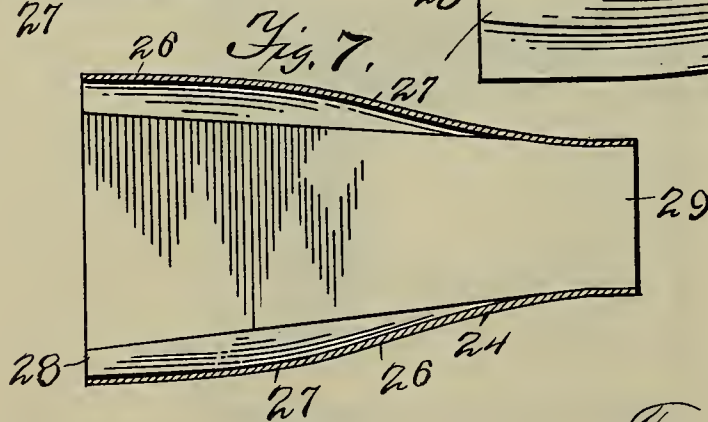
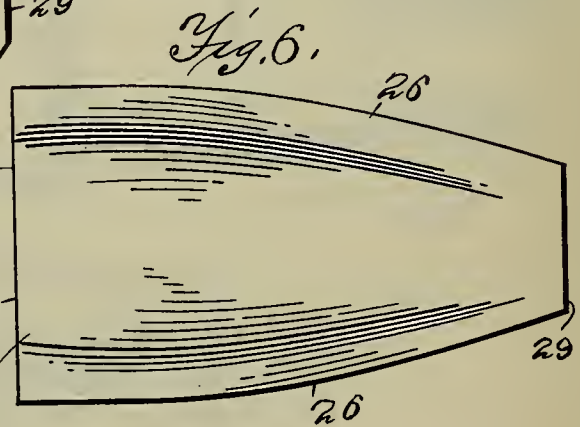
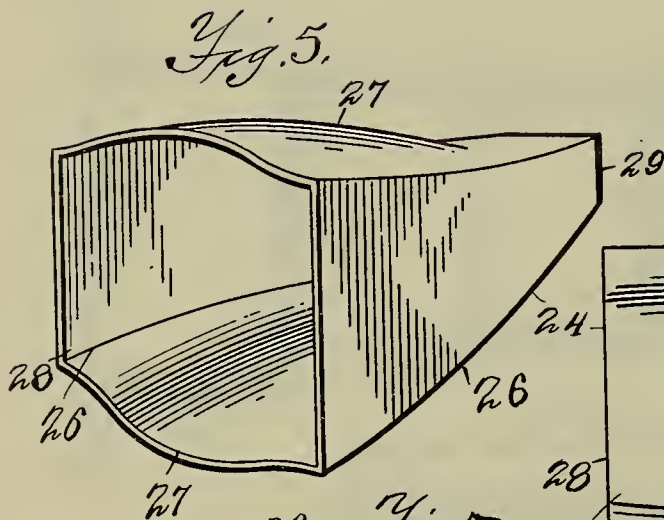
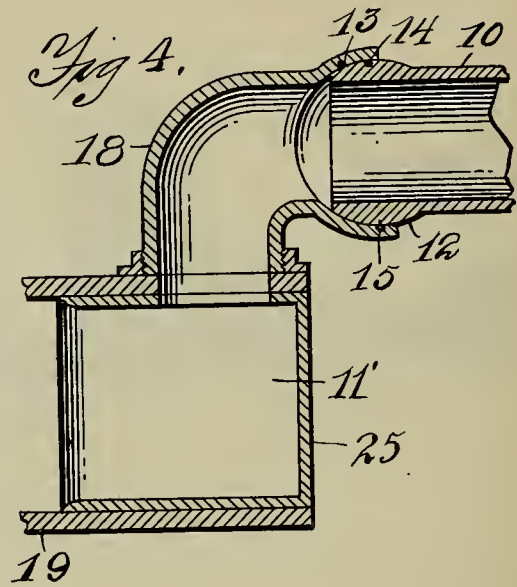
SOUND RESONATOR AND AMPLIFIER.

APPLICATION FILED MAR. 11, 1912. RENEWED NOV. 26, 1915.

1,170,800.

Patented Feb. 8, 1916.

3 SHEETS—SHEET 2.



Inventor

Forest Cheney

By

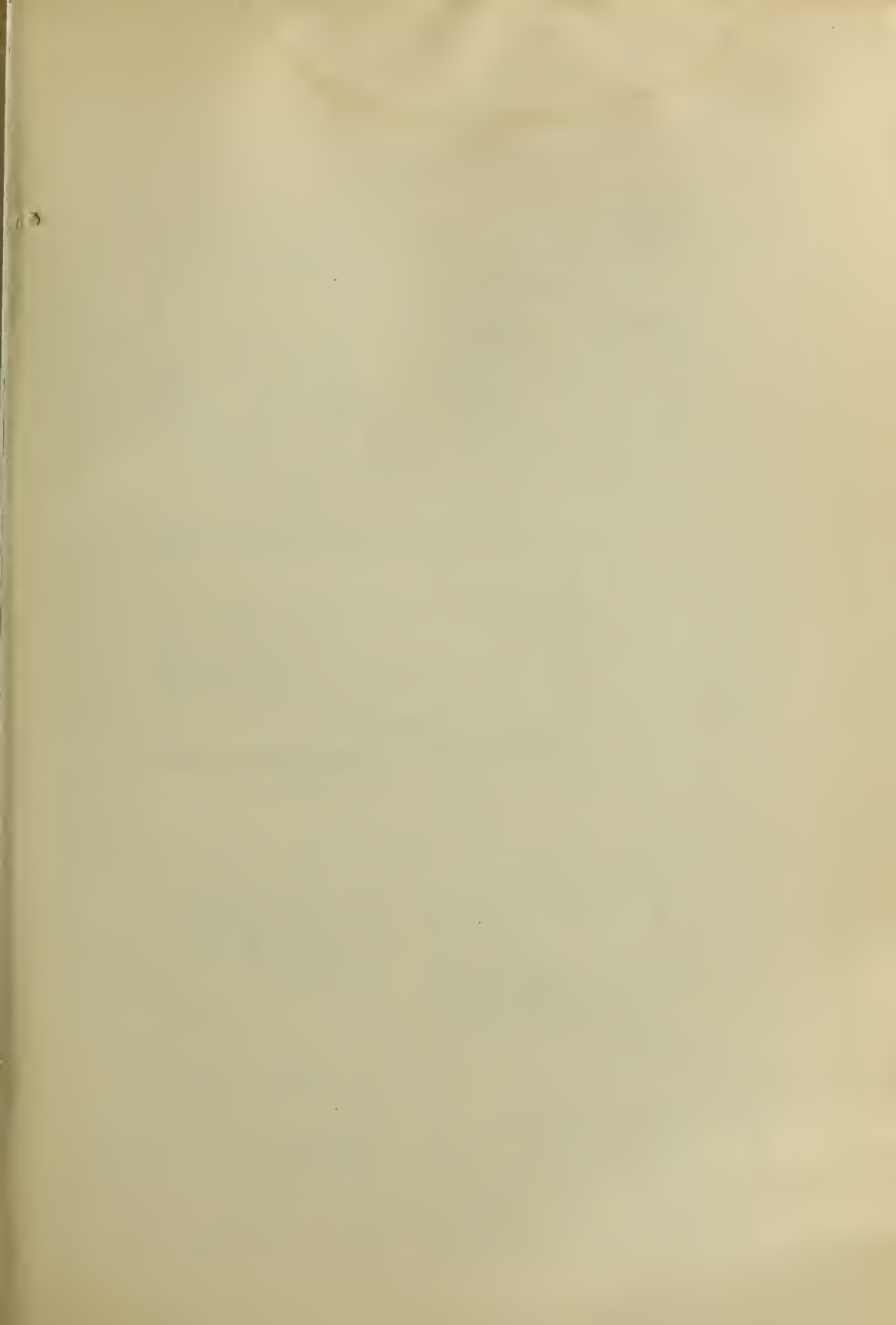
S. Arthur Baldwin

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Witnesses

Arthur C. Morse

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F. CHENEY.

SOUND RESONATOR AND AMPLIFIER.

APPLICATION FILED MAR. 11, 1912. RENEWED NOV. 26, 1915.

1,170,800.

Patented Feb. 8, 1916.

3 SHEETS—SHEET 3.

Fig. 8.

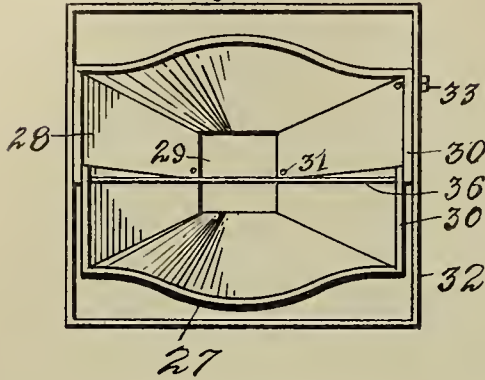


Fig. 9.

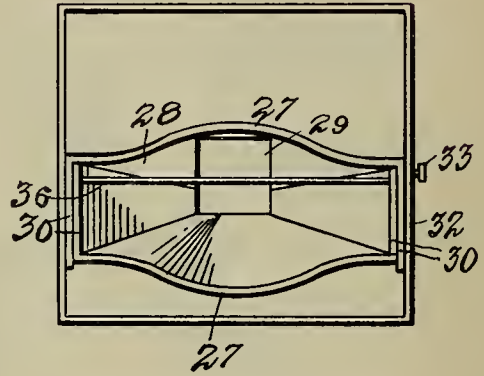


Fig. 10.

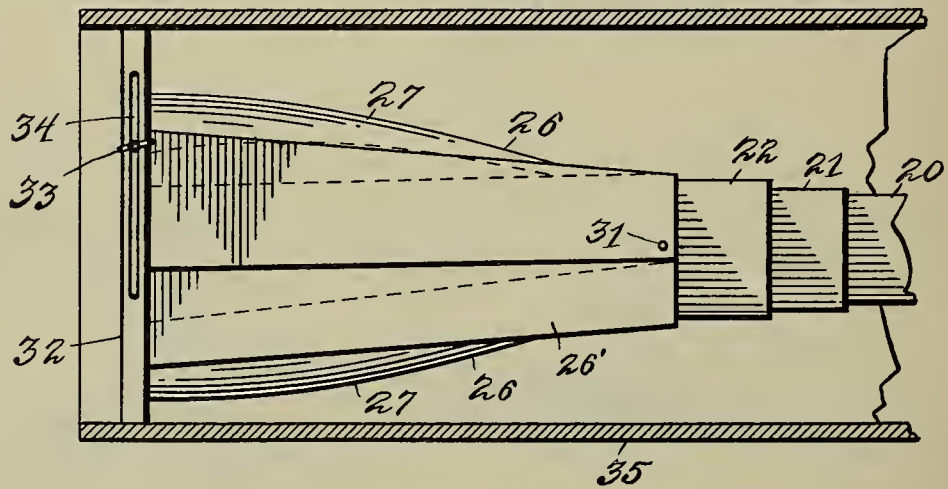
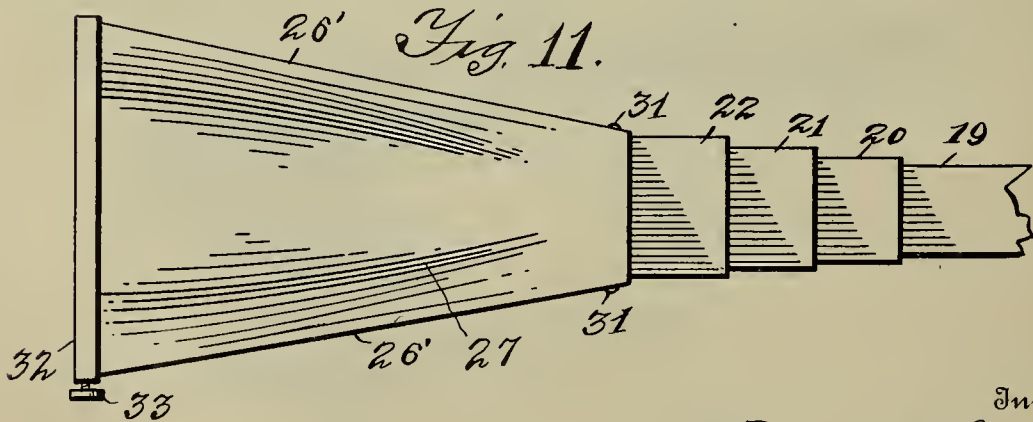


Fig. 11.



Witnesses

Arthur O. Morse
H. U. Harris.

Inventor

Forest Cheney

By

S. Arthur Baldwin.
Attorney

UNITED STATES PATENT OFFICE.

FOREST CHENEY, OF JAMESTOWN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO CHENEY TALKING MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION
OF ILLINOIS.

SOUND RESONATOR AND AMPLIFIER.

1,170,800.

Specification of Letters Patent.

Patented Feb. 8, 1916.

Application filed March 11, 1912, Serial No. 682,989. Renewed November 26, 1915. Serial No. 63,678.

To all whom it may concern:

Be it known that I, FOREST CHENEY, a citizen of the United States, residing at Jamestown, in the county of Chautauqua and

5 State of New York, have invented certain new and useful Improvements in Sound Resonators and Amplifiers, of which the following, taken in connection with the accompanying drawings, is a specification.
10 My invention is concerned with sound-reproducing machines, and more especially with those that are designed to reproduce complex sounds of a wide range, such as those of voices, orchestras and musical instruments generally. As is well known to those skilled in the art, while the initial vibrations of the diaphragm of such machines potentially set up all the complex air vibrations necessary to produce the fundamental tones and overtones going to make
15 up the character and tone color of all the instruments or voices (the tones of which are being reproduced), said air vibrations are nevertheless very weak, and must be
25 amplified and strengthened in order that the sounds will be reproduced in sufficient volume. Prior to my invention, it has been sought to effect this amplification by what are practically flaring horns or bells, the sides
30 of which diverge continuously and in such a manner as to produce conflicting and interfering vibrations therein, which serve to destroy some of the tones and overtones where it is amplifying the vibrations of a plurality of
35 instruments or voices simultaneously, as in concerted selections. Such horns or bells, when they are employed in a musical instrument, such as a cornet or trombone, are admirably adapted to give that single instrument its characteristic tone or color, but they fail lamentably as an amplifier in reproducing simultaneously the characteristic vibrations of a plurality of different instruments or voices, because they do not have proper
45 vibrating surfaces on their inner walls.

My invention is concerned primarily with a novel amplifier made up of a plurality of properly shaped "orchestral sections" located in the proper relative arrangement so that
50 the fundamental vibrations of all the orchestral instruments whose tones are reproduced may be amplified thereby and deliv-

ered therefrom in the proper relative arrangements to reproduce harmoniously and fully all the tones of all the instruments or
55 voices employed in making the record.

My invention is further concerned with a novel "violin resonator" to which the amplified air vibrations or sound waves from the "orchestral sections" are delivered, and
60 which by its own vibrations not only further amplifies said sound waves, but also reflects and refracts some of them so as to emphasize and augment the necessary overtones to bring out the richness and peculiar tone color
65 of the various instruments and voices originally employed in making the record. These amplified and resonated air vibrations escape from the resonator and are delivered to the hearers, and in this condition reproduce for
70 them the tones of the original instruments and voices with a marvelous perfection that is vastly superior to that of any sound-reproducing machine constructed prior to my invention.

To illustrate my invention, I annex hereto three sheets of drawings, in which the same reference characters are used to designate identical parts in all the figures, of which,—

Figure 1 is a side elevation of an amplifier having a plurality of graduated compartments or "orchestral sections;" Fig. 2 is a central longitudinal section through the same; Fig. 3 is an end view of the "orchestral sections," looking into the large end
80 thereof; Fig. 4 is a central sectional view of the first orchestral section of the amplifier, with the connecting tube entering from the side, instead of at the end, as shown in Figs. 1 and 2; Fig. 5 is a perspective view of the
85 violin-shaped horn or "violin resonator;" Fig. 6 is a plan view of the top or bottom of the same, showing the curved outlines thereof; Fig. 7 is a central longitudinal section of the same, showing the concave top
90 and bottom thereof; Fig. 8 is an elevation of the large end of a resonator made adjustable so as to vary the size of the large end according to the size of the room or space to be filled, the resonator being shown in its ex-
95 panded position; Fig. 9 is a similar view, with the resonator in its contracted position, as for a small room; Fig. 10 is a side elevation of the adjustable resonator with
100

the "orchestral-sections" amplifier attached thereto and mounted in a casing; and Fig. 11 is a top plan view of the same, showing the straight sides of the resonator.

5 The amplifier is made up of a plurality of sections 11, 19, 20, 21 and 22, and the tube 10 leading from the sound box may enter directly into the end of the smallest section, as seen in Figs. 1 and 2, where it may be connected to section 11 by a ball-and-socket joint 12, which has a spring 13 adapted to engage a notch 14 and thereby hold the sound box end of the tube 10 up at the desired angle with the needle out of engagement with the disk record, a pin 15 being provided at the lower side and entering a recess to hold the ball portion ordinarily in position in the socket 16 with the opening 17 leading directly from the socket 16 to the throat 11 while permitting the above described raising of the tube as well as its horizontal movement necessary in the passage of the needle from the inner to the outer portion of the disk record.

25 A modification of the direct connection is shown in Fig. 4, in which the tube 10 is connected in the same manner, to an elbow 18, which permits the admission of the sound waves at one side of the first orchestral section, instead of at the end, the orchestral section 11' in this case, of course, having the opening in the side, instead of in the end, as in Figs. 1 and 2.

Each orchestral section consists of a tubular section having flat parallel sides which act as vibrating surfaces for the sound waves of the particular register to which the section is adapted, and there are preferably four of these sides of equal size, with the opposite sides parallel, so that the section is square in cross section, it being essential that the opposed surfaces be flat and parallel with each other. The material for these sections is preferably a resonant wood.

45 While a single orchestral section might be used with the resonator to be hereinafter described, and better results obtained than if the single section were not employed, yet I preferably employ a series of these sections, of different sizes, so that all the sounds or tones belonging to each of the different registers, such as the soprano, alto, tenor and bass, will find a chamber or section within the range of that register and will be properly reinforced. The sides and length of these orchestral sections are carefully graduated, and they are preferably made so that they telescope snugly, so that they may be accurately adjusted, and when so adjusted, may be secured in position, preferably by an adhesive. In this manner a series of the orchestral sections may be adjusted so as to determine the correct length of the vibrating walls of each section to reinforce the various tones belonging to the desired register to which each section is devoted.

Each of the different orchestral sections slips on to one another as they are assembled, beginning with the smallest section 11, which reinforces the vibrations of the highest tones, and wherein said vibrations have the greatest intensity, and for this reason I preferably make its sides much thicker than those of the succeeding sections. To accomplish this conveniently, the length of the second section 19 is nearly doubled, so that the first section 11 may be slipped entirely within said section 19, thereby providing a strong vibrating body for the sides of the section 11 and giving added intensity to the vibrations. The sides of this smallest compartment might be made of one thickness, instead of two, and obtain substantially as good results, but the construction would not be so simple and convenient. The edges of the mouths 23 of each section leading into the next section are convex or curved outwardly, as shown, so as to give a free exit to the vibrations and to permit them to gradually pass from the smaller section to the larger sections. The mouth of the largest section leads directly into the small end 29 of the resonating horn.

While, for most purposes, the five sections shown in Figs. 1 and 2 are sufficient, for reproducing a full orchestra, a larger number, say seven, may be employed, but the principle of operation is the same in both cases, and I have simply mentioned seven as being the maximum number of sections that will ever be needed.

Referring now to the "violin resonator" shown in Figs. 5 to 11. I have shown in Figs. 5, 6 and 7 the simplest form, which is preferably made with all four sides concave and in the general form of substantially half of a violin body, having the swell 27 in the upper and under sides. This resonator is made of some resonant wood, as spruce, for example, and, as will be seen, gradually widens from the end 29 toward the mouth 28, thus gradually amplifying the tone. The concave vertical sides 26 and the concave top and bottom 27, however, by their shape, concentrate and refract some of the vibrations, thereby producing or emphasizing the overtones necessary to reproduce the tones of the various instruments in their original purity, and transmit the reproduced and augmented tones in perfect harmony.

The small end 29 of the resonator is preferably square in shape and of substantially the same size as the end of the largest orchestral section, as seen in Figs. 10 and 11, so that there will not be an abrupt increase of the air space in cross section in passing from the amplifier to the resonator. In order to adapt the "violin resonator" to large and small rooms, I may make it adjustable in size, as shown in Figs. 8 to 11. To accomplish

plish this purpose and interfere as little as possible with its resonating effect, the vertical sides 26' are made in two parts 30 which telescope within one another and are pivotally attached at 31, at the small end 29. The top and bottom are unchanged in design, but the sides 26' are made straight, instead of curved, to prevent their binding upon one another, as would be apt to occur if the curved sides 26 of the non-expandible resonator were employed. It will, however, be understood that I do not intend to limit the expandible resonator to one having the straight sides.

In order to hold the two halves of the expandible resonator securely in place, a frame 32 is provided around the mouth thereof. The two parts 30 may be held from rattling by a small strip of felt therebetween, and by a bar 36 across the mouth 28. In order to hold the sides 30 in the adjusted position, a thumb screw 33 is inserted through a slot 34 in the frame 32, the slot 34 extending lengthwise of the vertical side of the frame 32 and permitting the raising and lowering of the upper portion of the adjustable resonator, so that said upper portion may be raised to different angles, as shown in Figs. 8 and 9, and thereby adjusted to the capacity of the room, the thumb screw 33 being tightened on the frame 32 at the point at which it is desired to hold the upper portion of the horn.

The amplifier, made up of the orchestral sections and the resonator, with the frame 32, are preferably mounted in a case 35, which holds them firmly in position.

While it is difficult to ascertain exactly what is the action of a machine embodying my invention upon the air vibrations set up by the diaphragm, as I understand it, the feeble vibrations passing from the diaphragm through the tube 10 are delivered to the various orchestral sections 11, 19, 20, etc., and the fundamental vibrations of the wave lengths adapted to the register to which each section is devoted, are reinforced in said section by the vibration of the opposed, flat, parallel walls thereof, and the vibrations going to make up the fundamental tones, thus reinforced, are delivered together into the resonator. Without the resonator, the fundamental tones are amplified, but the overtones are not present as they should be, and the resulting tones do not have the color and intensity of the instruments being reproduced. The action of the resonator, by reason of the concave surfaces thereof refracting these fundamental tones, serves to add to or augment the overtones necessary to produce the original color and richness of the tones of the instruments, and as the fundamental tones, thus augmented and reinforced by the overtones, are delivered from the resonator, the effect, both

in volume, clarity and color, is substantially that of the original orchestra or voices being reproduced.

While I have shown and described my invention as embodied in the form which I at present consider best adapted to carry out its purposes, it is capable of some modifications, and I do not desire to be limited in the interpretation of the following claims except as may be necessitated by the state of the prior art.

What I claim as new, and desire to secure by Letters Patent of the United States, is:

1. An amplifying device for sounds consisting of a plurality of sections each composed of a plurality of flat vibrating walls parallel to the common axis, the walls of each section being spaced farther apart than those of the preceding section.

2. An amplifying device for sounds consisting of a plurality of sections each composed of a plurality of flat rectangular vibrating walls, each parallel to its opposed wall and to the common axis, the walls of each section being spaced farther apart than those of the preceding section.

3. An amplifying device for sounds consisting of a plurality of sections each composed of a plurality of flat vibrating walls parallel to the common axis, the walls of each section being spaced farther apart than those of the preceding section, and having their forward edges rounded off, as shown.

4. An amplifying device for sounds consisting of a plurality of sections each composed of a plurality of flat rectangular vibrating walls, each parallel to its opposed wall and to the common axis, the walls of each section being spaced farther apart than those of the preceding section, and having their forward edges rounded off, as shown.

5. An amplifying device for sounds consisting of a plurality of sections, each composed of four equal-sized flat vibrating walls, the adjacent walls being at right angles to each other, and the walls of all sections being parallel to a common axis, the walls of each section being spaced farther apart than those of the preceding section, and having their forward edges rounded off, as shown.

6. An amplifying device for sounds consisting of a plurality of sections, each composed of a plurality of flat vibrating walls parallel to the common axis, the forward end of each section being telescoped within the succeeding section, as shown, and having its inner edge rounded off, as shown.

7. A resonator for acoustical apparatus, polygonal in its general cross-section, having solid side walls all formed with concave inner faces, leading from a comparatively small entrance orifice by constantly increasing diameters in all transverse sections to a large exit orifice which has a greater area

than any other parallel cross-section, the dimensions of said orifice being much less than the length of the resonator.

8. A resonator for acoustical apparatus, 5 rectangular in its general cross-section, having solid side walls formed with four concave inner faces, leading from a comparatively small entrance orifice, square in cross-section, by constantly increasing diameters 10 in all transverse sections to a large generally rectangular exit orifice which has a greater area than any other parallel cross-section.

9. A resonator for acoustical apparatus, 15 rectangular in its general cross-section, having solid side walls, two of which are opposed and curve only in the direction of their length, while the other two opposed side walls have a swell like that of the top and bottom of a violin, said side walls leading 20 from a comparatively small square entrance orifice by constantly increasing diameters in all transverse sections to a large generally rectangular exit orifice which has a greater area than any other parallel cross-section 25 and which has outwardly convex curves on its longer sides formed by the above-mentioned swells in the side walls.

10. In an acoustical apparatus, the combination with an orchestral section composed 30 of an even number of flat vibrating walls parallel to a common axis, and the opposed walls parallel to each other, of a generally flaring resonator polygonal in its general cross section and having the main sides

thereof formed with concave inner walls, the 35 discharge end of the section opening into the small end of the resonator.

11. In an acoustical apparatus, the combination with an amplifier consisting of a plurality of sections, each composed of a plurality of flat vibrating walls parallel to the 40 common axis, the walls of each section being spaced farther apart than those of the preceding section, of a generally flaring resonator, polygonal in its general cross section, 45 and having the main sides formed with concave inner walls, the discharge end of the largest section opening into the small end of the resonator.

12. In an acoustical apparatus, the combination with an amplifier consisting of a plurality of sections, each composed of a plurality of flat rectangular vibrating walls, 50 each wall parallel to its opposed wall and to the common axis, the walls of each section being spaced farther apart than those of the preceding section, of a generally flaring resonator rectangular in its general cross 55 section and having the main sides thereof formed with concave inner walls, the outer end of the largest section opening into the 60 small end of the resonator.

In testimony whereof I have affixed my signature in the presence of two witnesses.

FOREST CHENEY.

Witnesses:

O. A. CARLSON,
L. T. BALDWIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND REPRODUCING MACHINE,
1,170,801-----F. Cheney,
Patented-Feb. 8th, 1918.
Filed-Nov. 7th, 1912.

1,170,801.

F. CHENEY.
SOUND REPRODUCING MACHINE.
APPLICATION FILED NOV. 7, 1912.

Patented Feb. 8, 1916.

2 SHEETS—SHEET 1.

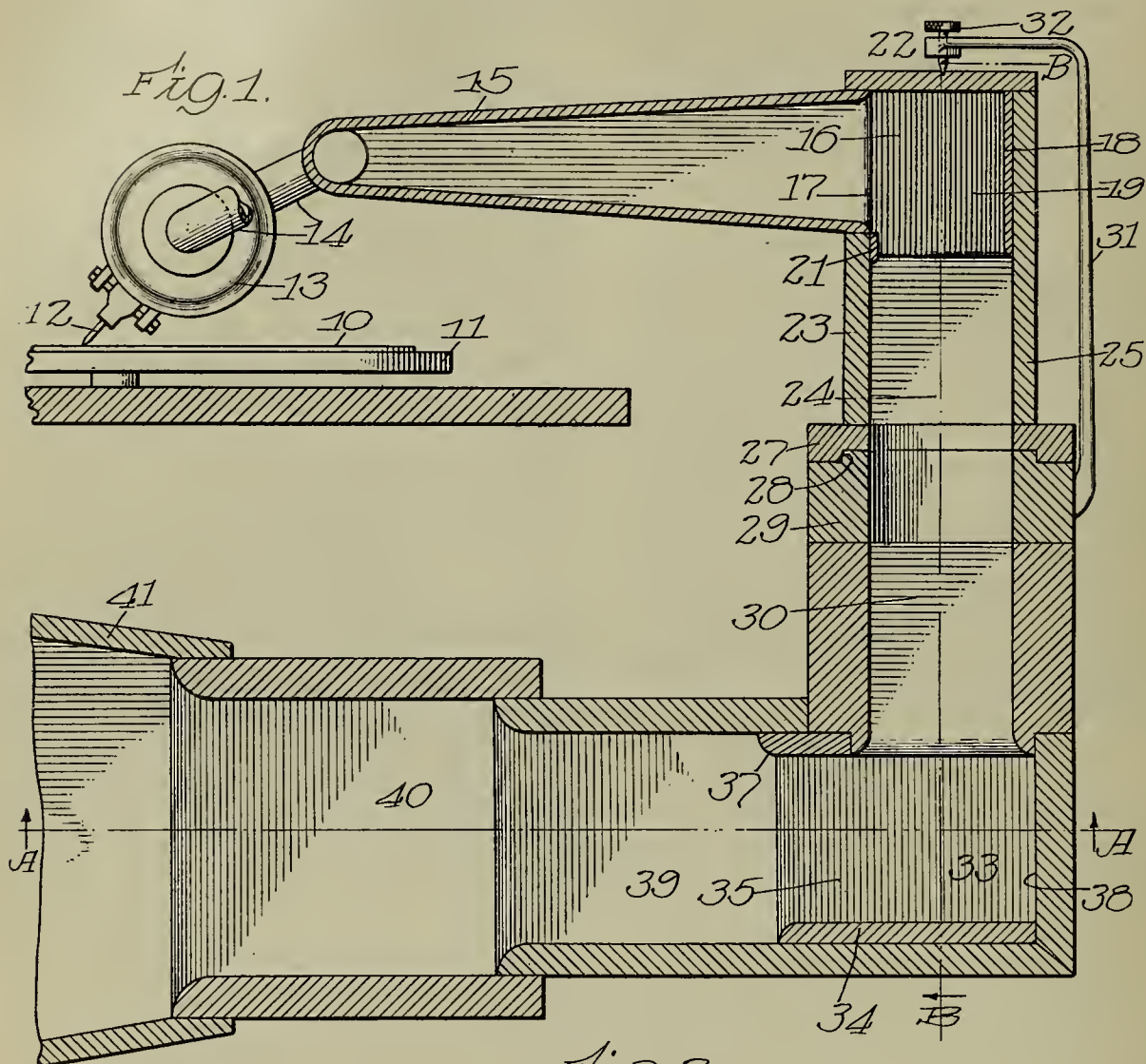
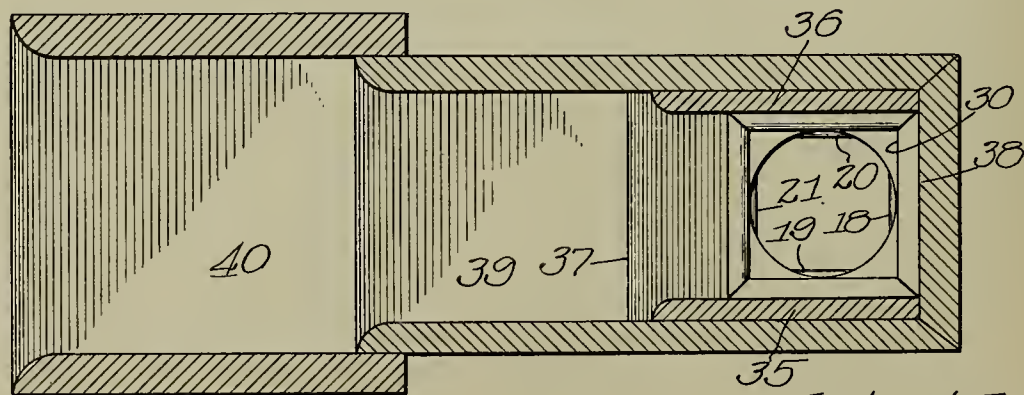
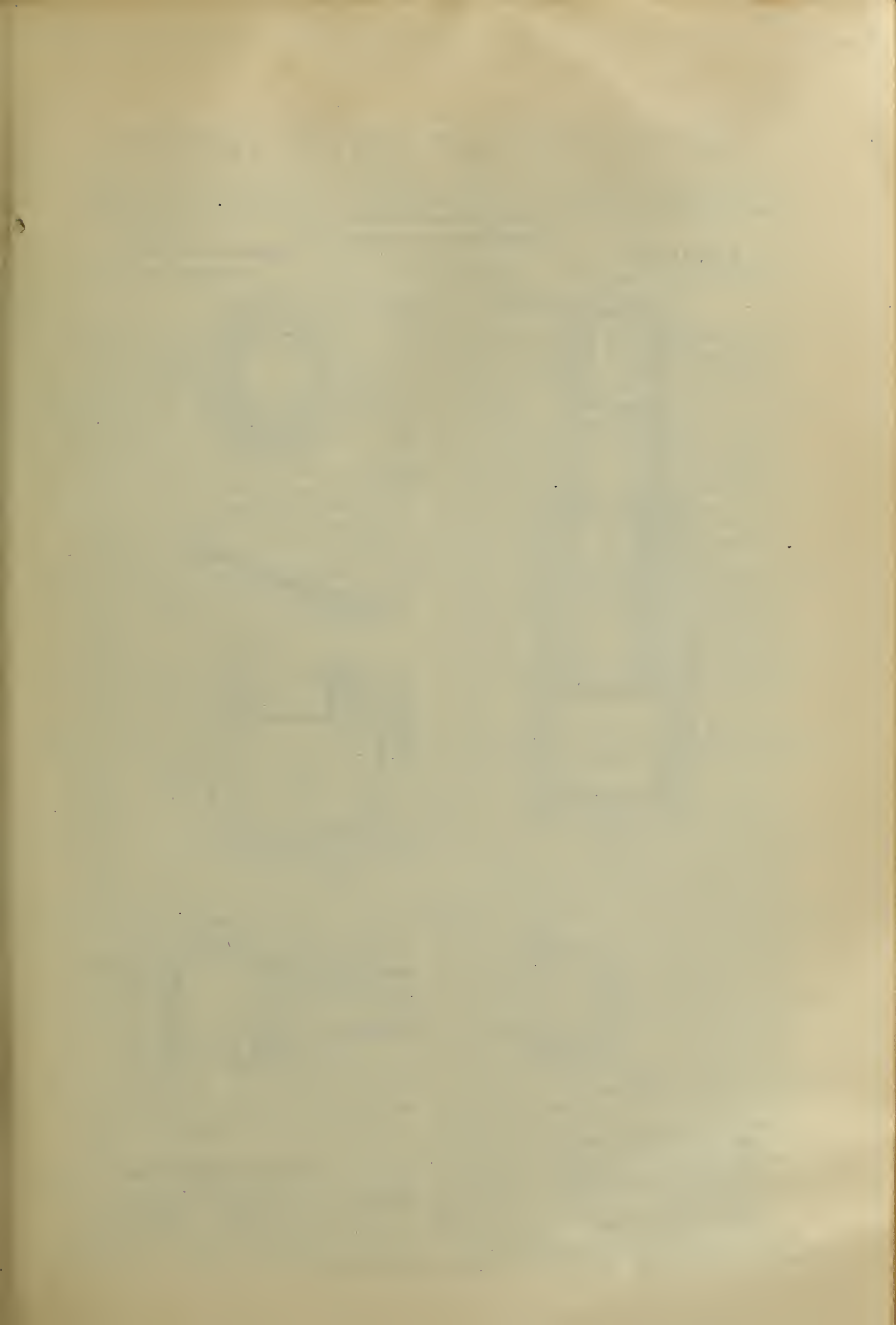


Fig. 2.



Witnesses:
H. W. Dornan Jr.
R. Bauerle

Inventor:
Forest Cheney
By: John Howard McElroy
his Atty.

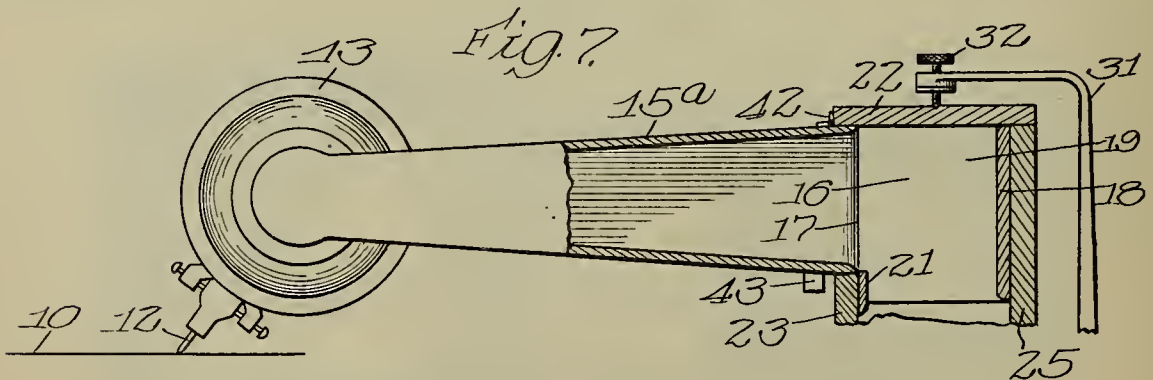
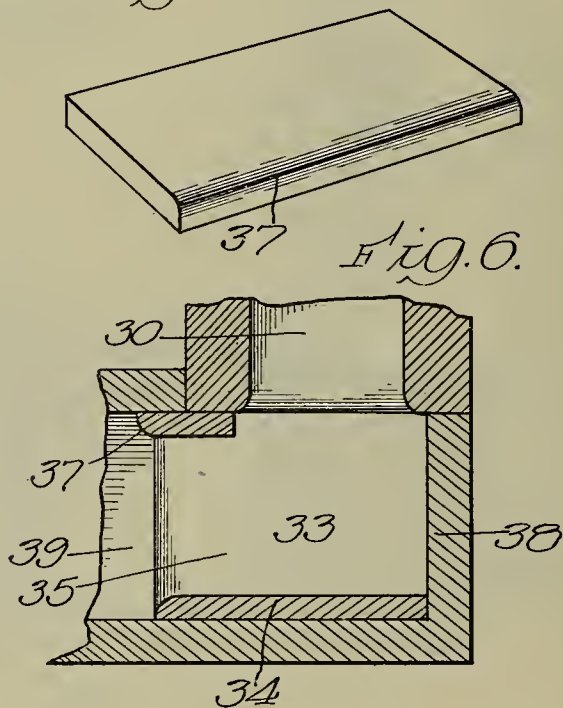
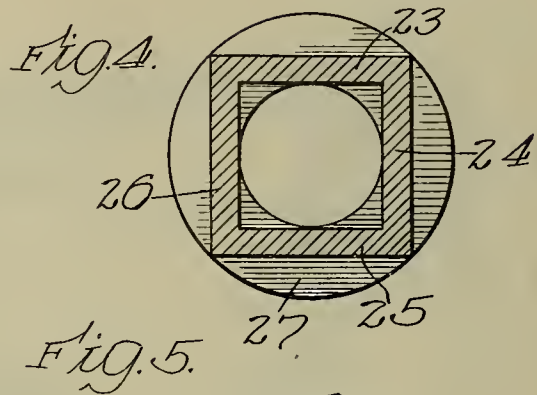
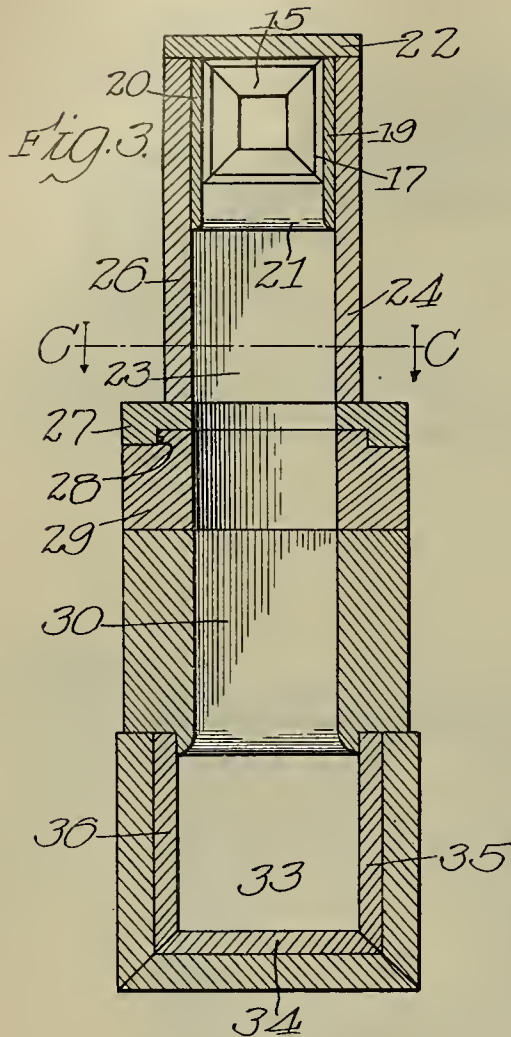


F. CHENEY.
SOUND REPRODUCING MACHINE.
APPLICATION FILED NOV. 7, 1912.

1,170,801.

Patented Feb. 8, 1916.

2 SHEETS—SHEET 2.



Witnesses:
G. W. Marus Jr.
R. Bauerle

Inventor:
Forest Cheney
By: John Howard McElroy
his Atty.

UNITED STATES PATENT OFFICE.

FOREST CHENEY, OF CHICAGO, ILLINOIS. ASSIGNOR, BY MESNE ASSIGNMENTS, TO CHENEY TALKING MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

SOUND-REPRODUCING MACHINE.

1,170,801.

Specification of Letters Patent.

Patented Feb. 8, 1916.

Application filed November 7, 1912. Serial No. 729,956.

To all whom it may concern:

Be it known that I, FOREST CHENEY, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a full, clear, and exact specification.

My invention is concerned with certain improvements upon the "orchestral sections" shown in my application No. 682,989, filed March 11, 1912, for Letters Patent of the United States, said "orchestral sections" being designed to reinforce or augment the air vibrations set up by the diaphragm and more perfectly reproduce the tones of the various orchestral instruments or voices to whose range or register the sections are adapted.

In the "orchestral sections" shown in the aforesaid application, which are of a generally cubical construction, open at both ends, the vibrations or sound waves enter one end and pass out of the other, the various sections being grouped so that their vibrating sides are parallel to each other and to a common axis, a complete set of sections presenting, as it were, the general effect of a flaring horn or bell, but square, instead of circular, in cross section, and with the rectangular inner walls arranged in parallel steps.

In my improved construction, instead of having all of said sections parallel to the same axis, I make one or more turns, or right angles, as it were, in the general direction in which the air vibrations or sound waves pass, and at each turn I place a modified orchestral section, which I call a "mechanical throat", as it is provided with a palate and has the general effect of modifying the clear, forcible and somewhat colorless tones produced by the straight orchestral sections, and clouding or restraining them sufficiently to give a more human tone to the voices and a more characteristic tone to the reproductions of the various instruments.

To illustrate my invention, I annex hereto two sheets of drawings, in which the same reference characters are used to designate identical parts in all the figures, of which,—

Figure 1 is a central longitudinal and vertical section through a portion of a sound-reproducing machine embodying my inven-

tion and containing a pair of the mechanical throats; Fig. 2 is a horizontal section on the line A—A of Fig. 1; Fig. 3 is a vertical section on the line B—B of Fig. 1; Fig. 4 is a horizontal section on the line C—C of Fig. 3; Fig. 5 is a perspective view of one of the palates detached, on an enlarged scale; Fig. 6 is a view of the lower mechanical throat shown in Fig. 1, but slightly modified in a manner to be explained; and Fig. 7 is a view similar to Fig. 1, and showing the upper mechanical throat, but with the connections to the tone arm slightly modified.

I have shown my invention as applied to the customary disk type of talking machine, in which the disk 10 is placed upon the rotating table or support 11, and is engaged by the needle 12 mounted in the customary manner in the sound box 13, which may be connected in any desired or customary manner by the tube or tubes 14 with the tone arm 15.

The structure so far described is of any ordinary type, and, instead of the disk style of machine, the invention might be applied to the cylinder type.

The tone arm 15 I have shown as square in its cross section, and in the form shown in Fig. 1, the end is firmly secured in one side of the first mechanical throat 16, which is, as seen, of a generally cubical design, comprising four closed sides forming flat inner walls, the adjacent walls being at right angles to each other and an entrance aperture through one side, the same being formed, in the present instance, by the rounded-off edges 17 of the tone-arm. The side 18 directly opposite to the entrance has the flat rectangular vibrating surface, and the two vertical sides 19 and 20, between the entrance and the side 18, are constructed like the side 18, and are of course parallel, and act as sound-reinforcing surfaces in the same manner as the four sides of the plain orchestral sections shown in my aforesaid application No. 682,989. The exit opening is at the bottom of the throat, in the position the uppermost or first throat occupies, and the boundary of the exit aperture is formed by the rounded-off edges of the sides 18, 19 and 20, and by the rounded-off lower edge of the palate bar 21. As shown, the palate bar is directly opposite the vibrating wall 18, and extends directly beneath the entrance aper-

ture. Its rounded lower edge preferably extends slightly below the corresponding rounded edges of the sides 18, 19 and 20, which make up the other three sides of the square

5 exit aperture. The mechanical throat occupying this position is subjected to very strong vibrations, and it must be solidly constructed, and as a convenient method of construction, I have shown the side walls 18, 19 and
10 20, and the palate 21, as made of comparatively thin pieces of resonant wood secured in the elongated box made up of the top piece 22, which also serves to form the side wall of the mechanical throat which is op-
15 posed to the exit aperture, and the side walls 23, 24, 25 and 26. These walls are so proportioned that the box just referred to is square in its horizontal cross section, and is about twice as long as the other two dimen-
20 sions. The lower end of this elongated box, which also is composed of resonant wood, is rigidly secured on the top of the annulus 27, which has the shoulder 28 formed on its under surface coöperating with a corre-
25 sponding shoulder formed on the annulus 29, which rests on the top of the orchestral section 30 to be described. The purpose of the annuli 27 and 29 is to form a construc-
30 tion so that the tone arm can swing in a horizontal plane, as is necessary where it is used with the disk record. To hold the annulus 27 and the parts attached thereto firmly upon the annulus 29, I provide the
35 arm 31 secured to the side of the annulus 29 and having a set screw 32 threaded through the end of the horizontal upper portion and coöperating with the recess in the center of the top piece 22, so that the pressure of the
40 annulus 27 on the annulus 29 can be regulated as may be desired.

The orchestral section 30 has the same internal dimensions as the portion of the elongated box having the sides 23, 24, 25 and 26
45 beneath the first mechanical throat 16, but, as will be noted, the walls of this orchestral section are thicker. The diameters of the concentric circular apertures in the annuli 27 and 29 are of the same length as the width of the square internal cross sections of the
50 orchestral section 30, and I may say that the portion of the rectangular box made up of the sides 23, 24 and 25, together with the orchestral section proper 30, act as a single
55 orchestral section in reinforcing certain vibrations between the opposed parallel vibrating walls, and the circular passage between these two portions in the annuli 27 and 29 serves merely to transmit the vibrations from one section to the other without materially
60 affecting the same.

In the preferred form, the rounded edges around the exit aperture of the orchestral section 30 serve as the entrance aperture for the second mechanical throat 33, which has
65 the same general dimensions, except that it

is larger, as the first mechanical throat 16, but it will be noted that its axis is horizontal, as it were, instead of vertical, as is the case of the first mechanical throat. This
70 second mechanical throat has the wall 34 opposite the entrance aperture, and the opposed parallel vertical side-walls 35 and 36, which correspond to the walls 18, 19 and
75 20 of the first mechanical throat. The exit aperture is formed by the rounded-off edges of the walls 34, 35 and 36, and of the palate bar 37, the rounded-off edge of which preferably extends forward of the edges of the
80 walls 34, 35 and 36. The exact location of this palate bar is a matter of adjustment, as its location varies to some extent the tones being reproduced by the apparatus. The wall 38 of the mechanical throat opposite the
85 exit aperture is formed by the end of the elongated rectangular box, the end of which forward of the mechanical throat constitutes the orchestral section 39. Its rounded-off exit aperture enters into the end of the
90 next orchestral section 40, whose rounded-off edge in turn enters into the small end of a resonator 41, which is preferably the violin resonator shown in my aforesaid applica-
95 tion No. 682,989.

Unmodified orchestral sections, like those shown in my aforesaid application, No. 682,989, are seen at 39 and 40, and it will be
100 noted that each consists of a substantially cubical box, preferably formed of resonant wood, and having one end open for the entrance aperture, and the opposed end with its rounded edges opening into the next section forming its own exit aperture and the
105 entrance aperture for the next section, which, as seen, is larger. The sound waves travel through these orchestral sections, and the waves of different pitch are reinforced by
110 their vibration in the particular orchestral sections adapted for their particular length.

Instead of having the rounded-off edges of the orchestral section 30 extend down
115 into the entrance aperture of the second mechanical throat 33, as shown in Fig. 1, I may have the rounded-off edges terminate just above the entrance to the mechanical throat, as indicated in the modification shown in
120 Fig. 6. This change in the location produces a slight change in the tones of the instruments or voices as reproduced.

In Fig. 7, I have illustrated a modification, in which the tone arm 15^a must be
125 swung up to disengage the needle 12 from the disk 10, and in this case the tone arm 15^a is pivoted by the hinge 42 to the edge of the top piece 22 to permit the tone arm to swing up, and in that case I preferably provide a
130 stop 43 on the under side of the tone arm to coöperate with the wall 23 to prevent the tone arm swinging down too far. I have found experimentally that the use of these
135 mechanical throats, or one of them, serves

to modify favorably the action of the instrument in reproducing the tones of solo voices and instruments, and, as I understand it, the action is about as follows: It will be noted that the sound waves passing into the mechanical throats, pass through the apertures and on to the opposing walls 18 and 34, from which the vibrations are reflected, and some of them are reflected back against the end walls 22 and 38. According to my understanding the rounded-off edge of the tone arm 15, in the one case, and of the orchestral section 30, in the other case, adjacent to the walls 22 and 38, respectively, prevent the unexpanded vibrations from engaging directly the walls 22 and 38, and, this leaves a thin air cushion next to the walls 22 and 38, and these air cushions provide vibrating surfaces that are so sensitive and flexible that they will vibrate in response to certain overtones that the solid walls cannot respond to, and, as a result, certain overtones essential to the perfect reproduction of some voices and some musical instruments can be augmented or reinforced with the result that the reproduced tone has all the overtones necessary to reproduce perfectly the voice or instrument, and in some cases a naturally feeble overtone or tones of the voice are so augmented as to produce by the machine a richer tone or quality, *i. e.*, one with fuller and better balanced overtones than the original voice or instrument. By changing the locations somewhat of the bars 21 and 37 I am enabled to modify to some extent the effects produced by them, and by their employment I am able to change the tones reproduced in much the same manner as the tones of the human voice can be changed by singing so as to resonate the tone in the roof of the mouth as compared with singing in such a manner as to throw the tone directly out without resonating it in the roof of the mouth. By the employment of these bars 21 and 37 which I have termed palates, I can reproduce much more perfectly such tones of the voice as are produced by singing in the manner above suggested.

While I have shown and described my invention as embodied in the form which I at present consider best adapted to carry out its purposes, it will be understood that it is capable of modifications, and that I do not desire to be limited in the interpretation of the following claims except as may be necessitated by the state of the prior art.

What I claim as new, and desire to secure by Letters Patent of the United States is:

1. A mechanical throat for sound-reproducing machines, consisting of a box-like structure having flat internal sides, two of said sides forming a pair of opposed imperforate parallel vibrating walls, a third side having an opening to receive the sound

waves, said opening being of substantially the area of the side in which it exists, and having the form of a regular polygon, a fourth side forming a vibrating wall opposite the sound-receiving opening, a fifth open side being adjacent the other open side to permit the exit of the sound waves, and a sixth side forming a vibrating wall opposing the last-mentioned open side, the entrance opening being offset from the wall opposite the exit so that a shallow air cushion is formed adjacent said wall.

2. A mechanical throat for sound-reproducing machines, consisting of a box-like structure provided with a pair of opposed parallel vibrating sides and open at one side to receive the sound waves, and having a vibrating wall at the opposite side, and open at a side adjacent the other open side to permit the exit of the sound waves, and having a vibrating wall opposing the second open side, and having a palate bar between the entrance and the exit apertures.

3. A mechanical throat for sound-reproducing machines, consisting of a generally cubical box-like structure open at two adjacent sides for an entrance and exit for the sound waves, and having the other four sides consisting of solid vibrating surfaces, and having a palate bar between the entrance and exit apertures.

4. A mechanical throat for sound-reproducing machines, consisting of a box-like structure provided with a pair of opposed parallel vibrating sides and open at one side to receive the sound waves and having a vibrating wall at the opposite side, and open at a side adjacent the other open side to permit the exit of the sound waves, and having a vibrating wall opposing the second open side, the edges of the entrance and exit apertures being rounded off as shown, and having a palate bar between the entrance and exit apertures.

5. A mechanical throat for sound-reproducing machines, consisting of a generally cubical box-like structure open at two adjacent sides for an entrance and exit for the sound waves, and having the other four sides consisting of solid vibrating surfaces, the edges surrounding the entrance and exit apertures being rounded off as shown, and having a palate bar between the entrance and exit apertures.

6. In a sound-reproducing machine, the combination with a tone arm, of a mechanical throat into the entrance opening of which the end of the tone arm extends, said mechanical throat consisting of a generally cubical box-like structure having flat internal walls, each at right angles to the adjacent walls and open at two adjacent sides for an entrance and exit for the sound waves, the entrance opening being substantially the area of its side, and the exit

opening occupying all of its side, and having the other four sides consisting of solid vibrating surfaces, one or more orchestral sections consisting of generally cubical box-like structures having four flat internal walls, each at right angles to the adjacent walls, said sections having two opposed sides omitted to form entrance and exit openings, said orchestral sections extending from the mechanical throat on the same axis, a second mechanical throat similar to the first, into the entrance opening of which the end of the last of the above-mentioned orchestral sections enters, and one or more orchestral sections similar to the first-defined sections extending from said second mechanical throat on the same axis.

7. In a sound-reproducing machine, the combination with a tone arm, of a mechanical throat into the entrance opening of which the end of the tone arm extends, said mechanical throat consisting of a generally cubical box-like structure having flat internal walls, each at right angles to the adjacent walls and open at two adjacent sides for an entrance and exit for the sound waves, the entrance opening being substantially the area of its side, and the exit opening occupying all of its side and having the other four sides consisting of solid vibrating surfaces, one or more orchestral sections consisting of generally cubical box-like structures having four flat internal walls, each at right angles to the adjacent walls, said sections having two opposed sides omitted to form entrance and exit openings, said orchestral sections extending from the mechanical throat on the same axis, a second mechanical throat similar to the first, into the entrance opening of which the end of the last of the above-mentioned orchestral sections enters, one or more orchestral sections similar to the first-defined sections extending from said second mechanical throat on the same axis, and a resonator into which the end of the last of the second-mentioned orchestral sections enters.

8. In a sound-reproducing machine, the combination with a tone arm, of a mechanical

throat consisting of a generally cubical box-like structure having flat internal walls, each at right angles to the adjacent walls, and open at two adjacent sides for an entrance and exit for the sound waves, the entrance opening being substantially the area of its side, and the exit opening occupying all of its side, and having the other four sides consisting of solid vibrating surfaces, the end of said tone arm opening into the entrance opening of the mechanical throat, a second mechanical throat similar to the first but extending at right angles thereto, and a swivel joint having an interior passage circular in cross section interposed between the two throats.

9. In a sound-reproducing machine, the combination with a tone arm, of a mechanical throat consisting of a generally cubical box-like structure having flat internal walls, and open at two adjacent sides for an entrance and exit for the sound waves, the entrance opening being substantially the area of its side, and the exit opening occupying all of its side, and having the other four sides consisting of solid vibrating surfaces, the discharge end of the tone arm extending into the entrance opening of the mechanical throat, a second mechanical throat similar to the first but extending at right angles thereto, one or more orchestral sections consisting of generally cubical box-like structures having flat internal walls, each at right angles to the adjacent walls, and open at two opposed sides for an entrance and exit for the sound waves, said orchestral sections extending beyond the second mechanical throat on the same axis, and connections between said mechanical throats, including a passage extending from the exit opening of the first throat into the entrance opening of the second throat.

In witness whereof, I have hereunto set my hand and affixed my seal, this 25th day of October, A. D. 1912.

FOREST CHENEY. [L. s.]

Witnesses:

JOHN HOWARD McELROY,
MILDRED ELSNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND REPRODUCING MACHINE,
1,170,802-----F. Cheney,
Patented-Feb. 8th, 1916.
Filed-May 21st, 1913.

F. CHENEY.
SOUND REPRODUCING MACHINE.
APPLICATION FILED MAY 21, 1913.

1,170,802.

Patented Feb. 8, 1916.

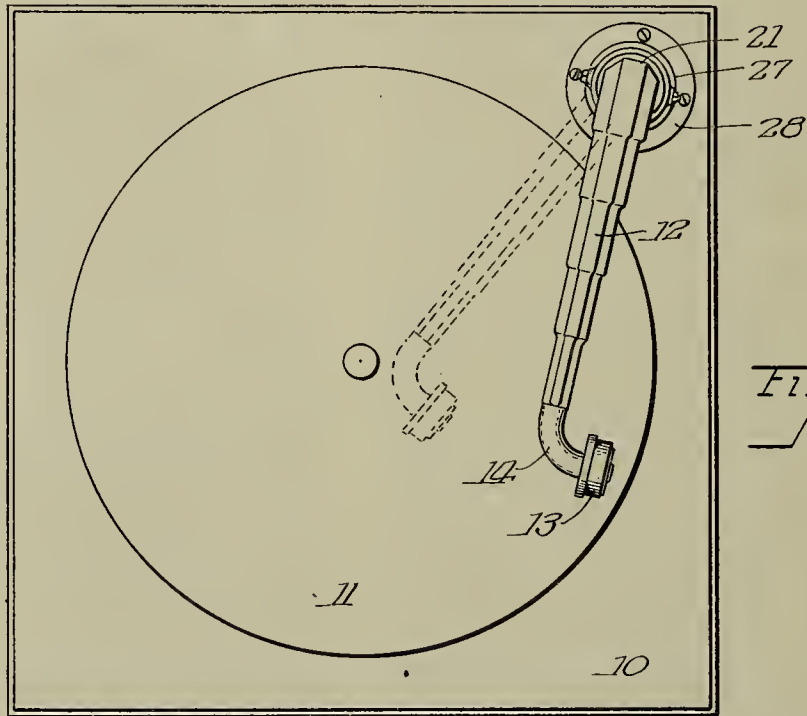


Fig. 1.

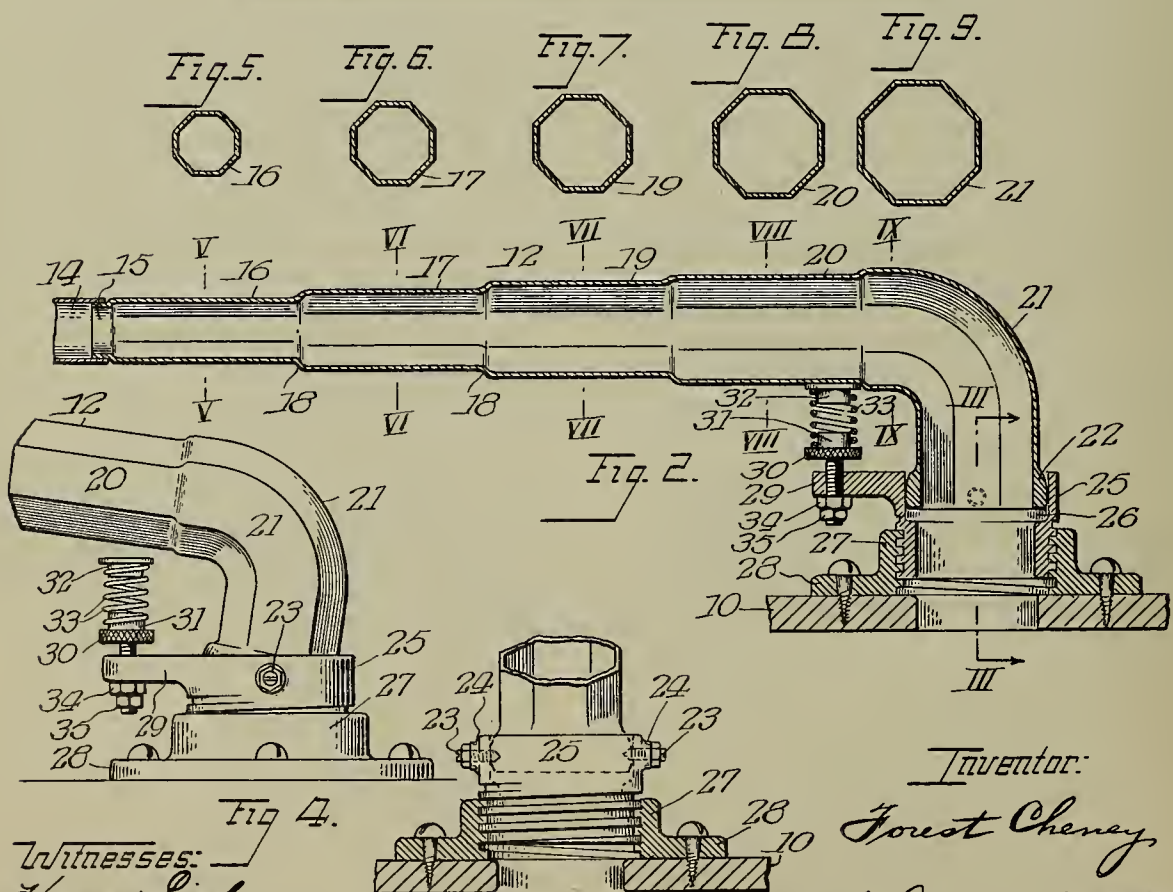


Fig. 2.

Fig. 4.

Witnesses:
Hiram Lisle
Jno. G. Elliott

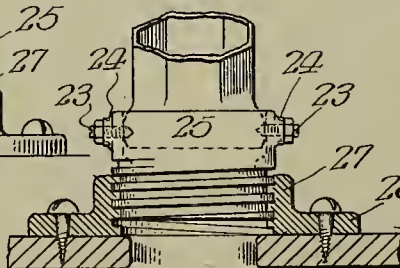


Fig. 3.

Inventor:
Forest Cheney
by John Howard McElroy
his Attorney.

UNITED STATES PATENT OFFICE.

FOREST CHENEY, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
CHENEY TALKING MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION
OF ILLINOIS.

SOUND-REPRODUCING MACHINE.

1,170,802.

Specification of Letters Patent.

Patented Feb. 8, 1916.

Application filed May 21, 1913. Serial No. 768,905.

To all whom it may concern:

Be it known that I, FOREST CHENEY, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a full, clear, and exact specification.

My invention is concerned with sound reproducing devices, and primarily with the construction and mounting of the swinging tone arm, which connects the sound box mounted on the end thereof with the amplifying horn, which horn is ordinarily rigidly mounted, and must have a connection with the tone arm by which the latter can swing in a horizontal plane to permit the needle to move from the edge to the center of the disk record, and which must also be capable of swinging vertically to permit the disengagement of the needle from the disk.

One feature of my present invention consists of a specific modification of the generic invention in orchestral sections shown in my application No. 682,989, filed March 11, 1912, and in the application of said invention to the tone arm, said invention being specifically shown in the aforesaid application, No. 682,989, as applied to the stationary amplifying horn.

Another feature of my invention consists in the employment of a novel spring adjustment for the tone arm by which the weight of the outer end thereof and of the sound box can be counterbalanced or neutralized, thus regulating the pressure of the needle upon the disk.

A third feature of my invention resides in the novel mounting of the tone arm upon the casing to which the amplifying horn is connected.

To illustrate my invention, I annex hereto a sheet of drawings, in which the same reference characters are used to designate identical parts in all the figures, of which,—

Figure 1 is a top plan view of a sound-reproducing machine having my invention applied thereto; Fig. 2 is a longitudinal section through the tone arm on an enlarged scale; Fig. 3 is a detail of a portion thereof in section on the line III—III of Fig. 2;

Fig. 4 is a detail showing the tone arm lifted to disengage the needle from the record; and Figs. 5, 6, 7, 8 and 9 are vertical sections through the tone arm on the lines V—V, VI—VI, VII—VII, VIII—VIII and IX—IX, respectively, of Fig. 2.

I have found that, for the reasons fully set forth in my aforesaid application No. 682,989, the amplifying part of a sound-reproducing machine produces a much more perfect reproduction of the tone quality of the voices and instruments making the record if, instead of employing an ordinary tapered horn or sound-amplifying device, the same be made up of a plurality of sections each having a plurality of flat, rectangular vibrating walls parallel to a common axis, with the walls of each section spaced farther apart than those of the preceding section, and in my aforesaid application, I have shown these sections as applied to the construction of the amplifying horn only, and not to the tone arm.

In my present application, I apply the same principle to the construction of the tone arm; and in Fig. 1, 10 indicates the top of the cabinet, while 11 indicates the customary rotating disk support, and 12 indicates my improved tone arm, which must swing from the full-line position to the dotted-line position in playing a record. As will be apparent, the sound box 13 has its customary location on the end of the tone arm, and is connected with the main portion of said tone arm by the customary elbow 14, which is fitted over the cylindrical end of the tone arm proper. Immediately adjacent this short cylindrical end 15 is the section 16, which will be seen to have the design of a regular octagon in cross section, and which is preferably constructed of some suitable sheet metal. The eight walls of the section are preferably all rectangular, of the same size, parallel to the common axis, and are parallel to the opposed walls, so that the air vibrations from the sound box, will pass through the section and reverberate from the opposed walls, increasing the intensity of the vibrations. At the end of the section 16, it merges into a similar section 17, which, however, is of increased diameter and is con-

nected to said section 16 by the gentle curve 18, which I have found to be essential in properly connecting these sections to prevent any disturbance of the vibrations in passing from one section to another. The section 17 merges through a similar curved portion to the similar section 19, which in turn merges through a similar curved portion into a similar section 20, each successive section increasing in diameter, although retaining the same cross section, as is clearly shown in Figs. 5 to 9. The final section 21 is preferably curved through an angle of ninety degrees, forming an elbow, and the lower end thereof has a flange or enlargement 22 constituting a collar generally spherical in its outline, and adapted to receive at opposed points set screws 23, which are threaded through opposed lugs or bearings 24 in the upper portion of the ring 25. With the connection shown, the tone arm is free to vibrate in a vertical plane as much as may be necessary to raise the needle out of contact with the disk.

The ring 25 preferably has an offset therein, so that the internal diameter of the lower part is of approximately the diameter of the section 21, as it is not desirable to have a sudden increase in the bore of the passage. The external part of the lower portion of the ring 25 is threaded, as shown, and engages the internally-threaded flange 27 of the collar 28, which is screwed on the top 10 of the cabinet, as will be readily apparent. This threaded connection between the ring 25 and the collar 28 permits the tone arm to swing in a horizontal plane as much as may be necessary to permit it to move from the full-line to the dotted-line position of Fig. 1, and that without any material change in the vertical position of the sound-box end of the arm.

In my invention I provide a very efficient regulation for the pressure of the needle on the disk by placing the arm 29 on the ring 25 and threading through said arm a set screw 30. The head of the screw is provided with a lug 31, and an opposed lug 32 carried by the spring 33 coöperates with the under side of the section 20 of the tone arm, and a helically-coiled expanding spring 33 is interposed between said lugs. By turning the screw 30 up or down, the pressure of the needle of the sound box upon the disk can be varied to make it as light or heavy as is desired, and when the desired pressure is attained, I preferably set the nut 34 and the lock nut 35 coöperating with the screw 30 on the under side of the bracket 29 so that the precise adjustment will be maintained without any change.

While I have shown and described my invention as embodied in the form which I at present consider best adapted to carry out its purposes, it will be understood that it is

capable of modifications, and that I do not desire to be limited in the interpretation of the following claims except as may be necessitated by the state of the prior art.

What I claim as new, and desire to secure by Letters Patent of the United States, is:

1. In a sound-reproducing machine, a tone arm made up of a plurality of sections, each section composed of a plurality of flat vibrating walls, each parallel to its opposed wall and to the common axis, the opposed walls of each section being spaced farther apart than those of the preceding section.

2. In a sound-reproducing machine, a tone arm made up of a plurality of sections, each section composed of eight equal sized flat vibrating walls, each wall being parallel to its opposed wall and to the common axis so that the cross section of the arm is a regular octagon, the opposed walls of each section being spaced farther apart than those of the preceding section.

3. In a sound-reproducing machine, a tone arm comprising horizontal and vertical portions connected by an intermediate curved portion, the horizontal portion of said arm being made up of a plurality of sections, each section composed of a plurality of flat vibrating walls, each parallel to its opposed wall and to the common axis, the opposed walls of each section being spaced farther apart than those of the preceding sections.

4. In a sound-reproducing machine, a tone arm comprising horizontal and vertical portions connected by an intermediate curved portion, said tone arm throughout being made up of a plurality of sections, each section composed of a plurality of flat vibrating walls each parallel to its opposed wall and to the common axis, the opposed walls of each section being spaced farther apart than those of the preceding section.

5. In a sound reproducing machine, the combination with an interiorly-threaded collar secured to and projecting above the upper horizontal surface of a support, of a ring screwed into said collar and adapted to turn therein, said ring having an upper portion of larger interior diameter than the lower portion thereof, a tone arm having its larger end pivoted in the upper portion of said ring so as to swing in a vertical plane, the inner surface of the larger end of said tone arm being in register with the inner surface of the lower portion of said ring and with an opening through said support, a lug projecting laterally from the upper portion of said ring beneath said tone arm, and a spring interposed between said lug and the tone arm.

6. In a sound-reproducing machine, the combination with an interiorly-threaded collar secured to a cabinet, of a ring screwed into the top of the collar and adapted to turn easily therein, a tone arm having its

larger end pivoted in the top of the ring so
as to swing in a vertical plane, an arm on
the ring, a screw threaded through the arm
having a lug on its upper end, an opposed
5 lug engaging the under side of the tone arm,
and a helically-coiled spring interposed be-
tween said lugs, for the purpose described.

In witness whereof, I have hereunto set
my hand and affixed my seal, this 19th day
of May, A. D. 1913.

FOREST CHENEY. [L. s.]

Witnesses:

JOHN HOWARD McELROY,
MILDRED ELSNER.

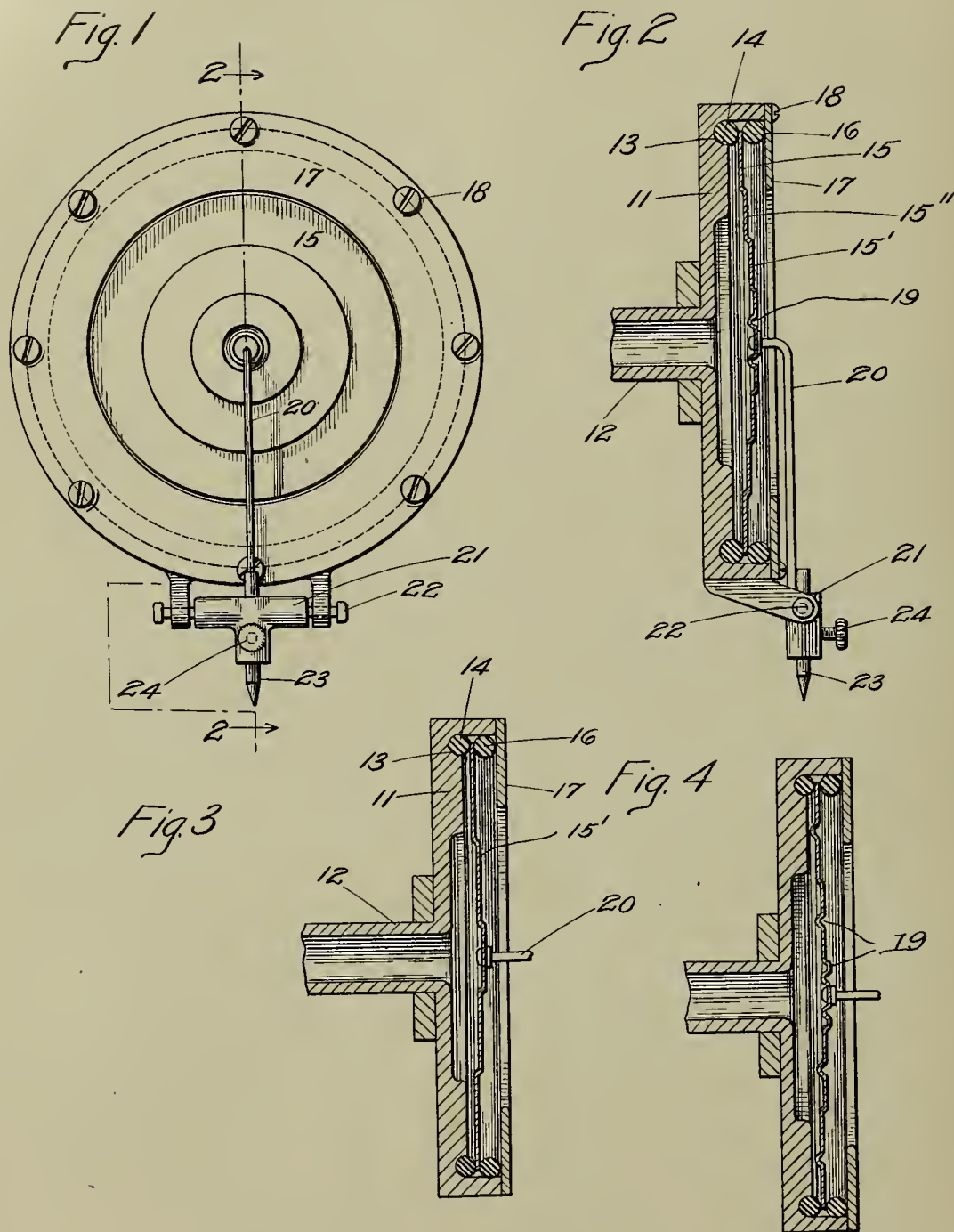
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

SOUND REPRODUCING APPARATUS,
#1,170,803-----F. Cheney,
Patented-Feb. 8th, 1916.
Filed-Sept. 22nd, 1913.

F. CHENEY.
SOUND REPRODUCING APPARATUS.
APPLICATION FILED SEPT. 22, 1913.

1,170,803.

Patented Feb. 8, 1916.



Witnesses:
C. Burnap By
Maurice Bolton Sheridan Wilkinson & Scott

Inventor:
Forest Cheney
Atty's

UNITED STATES PATENT OFFICE.

FOREST CHENEY, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
CHENEY TALKING MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION
OF ILLINOIS.

SOUND-REPRODUCING APPARATUS.

1,170,803.

Specification of Letters Patent.

Patented Feb. 8, 1916.

Application filed September 22, 1913. Serial No. 791,237.

To all whom it may concern:

Be it known that I, FOREST CHENEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sound-Reproducing Apparatus, of which the following is a specification.

The principal object of my invention is to provide a new and improved sound reproducer especially adapted for use in gramophones.

Another object of my invention is to provide an improved diaphragm for a sound reproducer.

Still another object of my invention is to provide a sound reproducer with its diaphragm so formed as to reproduce sounds from a record with a superior proportioning and quality of the various component tones.

All these objects will be made apparent in connection with the following specification and claims taken with the accompanying drawings in which I have illustrated one specific embodiment of my invention.

It will be understood that the invention itself is defined in the appended claims.

As is well known to those skilled in the art, the sound waves thrown off by the diaphragm of a sound reproducer do not ordinarily combine the tone giving components in the proper proportion as they occurred initially in the sound from which the record was derived. To this defect is due the unnaturalness of the sounds coming from such a sound reproducer. I have determined, as the result of much study and experiment, that by certain modifications of the diaphragm which I will describe, I can cause it to reinforce or accentuate the necessary overtones so as to bring out the full richness and peculiar tone color of the various instruments and voices originally employed in making the record. Instead of making the diaphragm as a plane disk of sheet material, I form it in shallow annular steps and in this way the desired result is attained.

Referring to the drawings: Figure 1 is an elevation of my improved sound reproducer; Fig. 2 is a vertical section of the same along the line 2—2 of Fig. 1; Fig. 3 is a corresponding vertical section of a modified form of the device; Fig. 4 is a similar section of a further modification.

The sound reproducer comprises a chamber wall, with a central conduit 12 for the escape of the sound waves generated within the chamber. Opposite to the chamber wall 11 the chamber is bounded by the specially formed diaphragm 15 whose peripheral edge is clamped between the rubber rings 14 and 16, the ring 14 lying in the annular groove 13 and the parts being clamped in place by the annular plate 17, secured by the screws 18. Around the center of the diaphragm 15 is an annular bead 19 within which is secured the upper end of the lever 20. This lever 20 is rigidly connected with the block 21 pivoted at 22, and the block 21 carries the needle 23 secured by the set screw 24.

The diaphragm 15 has its central portion lying substantially in a plane except for the heretofore mentioned bead 19. Surrounding the central plane portion of the diaphragm but stepped aside slightly so as to lie in a slightly offset parallel plane, is the annular portion 15'. Around this part 15' similarly stepped therefrom, is another annular portion 15''. The number of these annular steps in the diaphragm may be varied within limits according to the character and capacity of the apparatus and as may be determined by experiment and investigation. In Fig. 3 I have shown a diaphragm in only three slightly offset parallel planes. Such a diaphragm is intended and adapted for a somewhat smaller machine than the diaphragm shown in Fig. 2. In Fig. 4 I have shown a bead 19 in each annular step.

I have found, as a result of much investigation and experiment, that a sound reproducer provided with a diaphragm constructed on the principle herein set forth is admirably adapted for reproducing sounds with the most desirable tone quality. The results obtained may be varied and determined somewhat by the number of steps given to the diaphragm and by the relative width of each step. I find that substantially the proportions shown in Fig. 2 of the drawings give very superior and satisfactory results, that is having the annular steps of approximately equal width.

I claim:—

1. In a sound-reproducing device, an integral diaphragm of uniform thickness and imperforate from its center to the periphery

and comprising a series of smooth concentric annular sections lying in progressively stepped parallel planes.

2. In a sound box for sound-reproducing machines, an integral diaphragm of uniform thickness having a central hole for the attachment of a stylus lever and imperforate from its center to its periphery and comprising a series of smooth concentric annular sec-

tions lying in progressively stepped parallel planes.

In testimony whereof, I have subscribed my name.

FOREST CHENEY.

Witnesses:

GEO. L. WILKINSON,
MAURICE BOLTON.

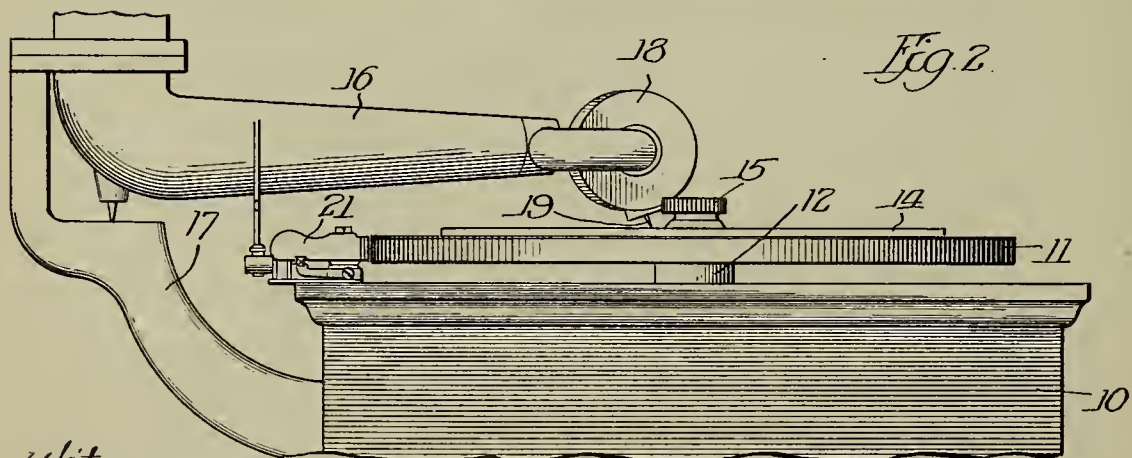
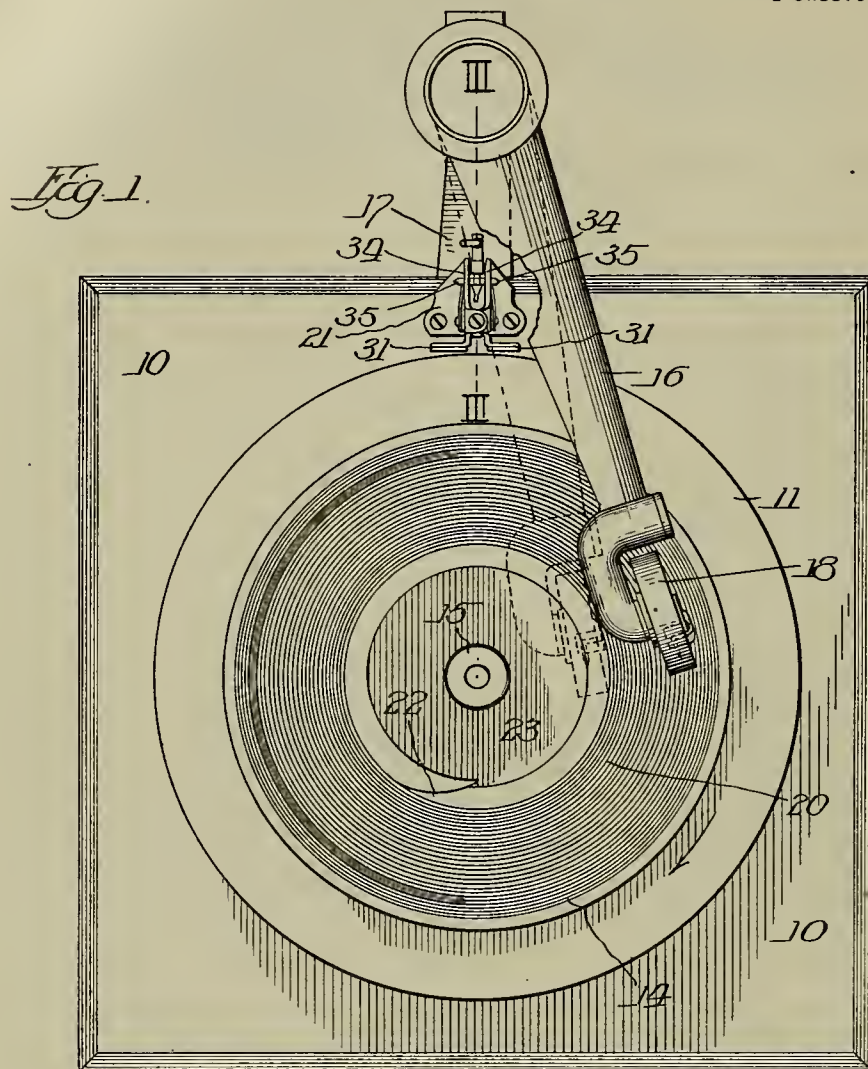
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

STOP MECHANISM FOR GRAPHOPHONES,
#1,170,997-----O. L. Scaibom,
Patented-February 8th, 1916.
Filed-February 15th, 1913.

O. L. SCALBOM.
STOP MECHANISM FOR GRAPHOPHONES.
APPLICATION FILED FEB. 15, 1913.

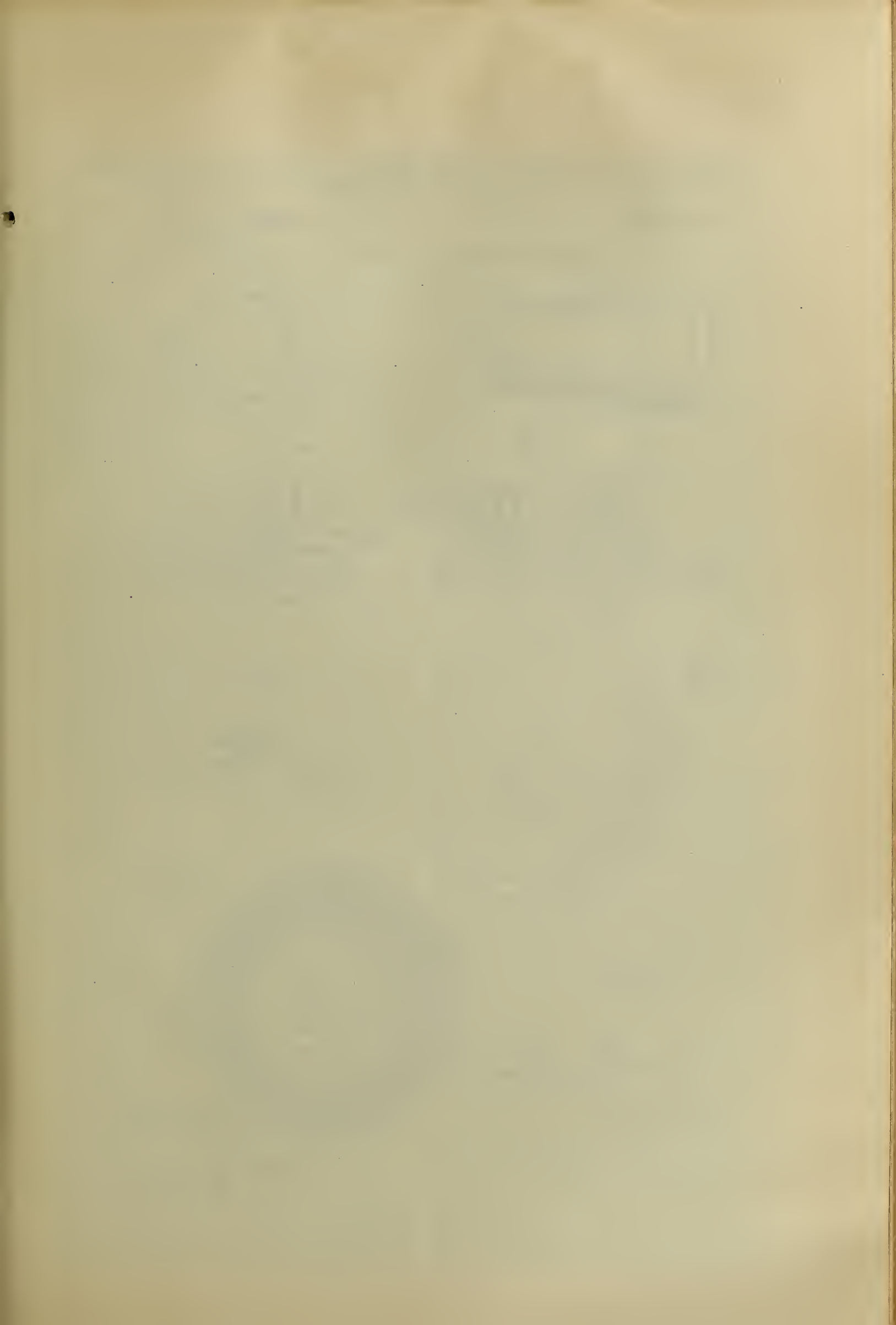
1,170,997.

Patented Feb. 8, 1916.
2 SHEETS—SHEET 1.



Witnesses:
Ed. C. Davison
Martha Westman

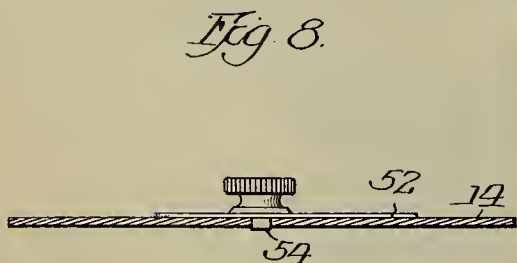
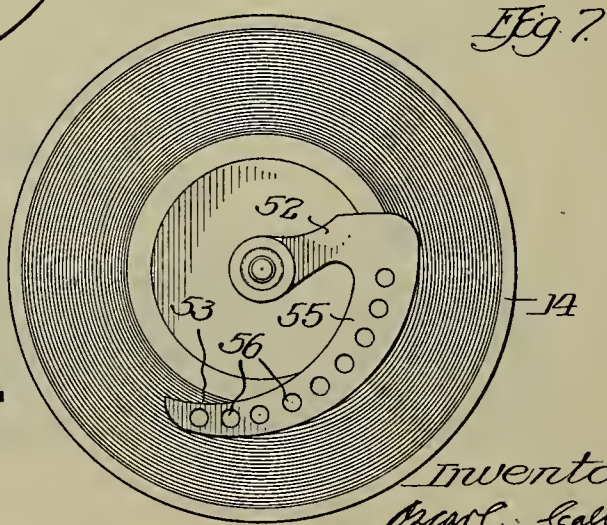
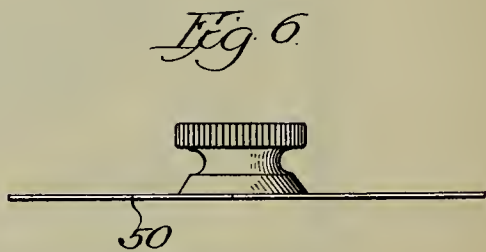
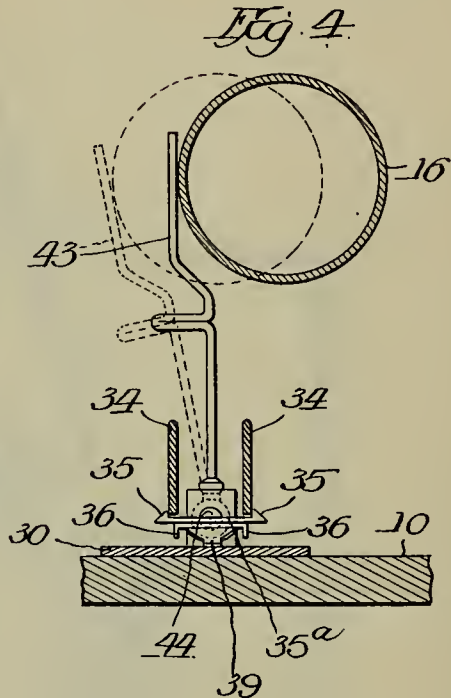
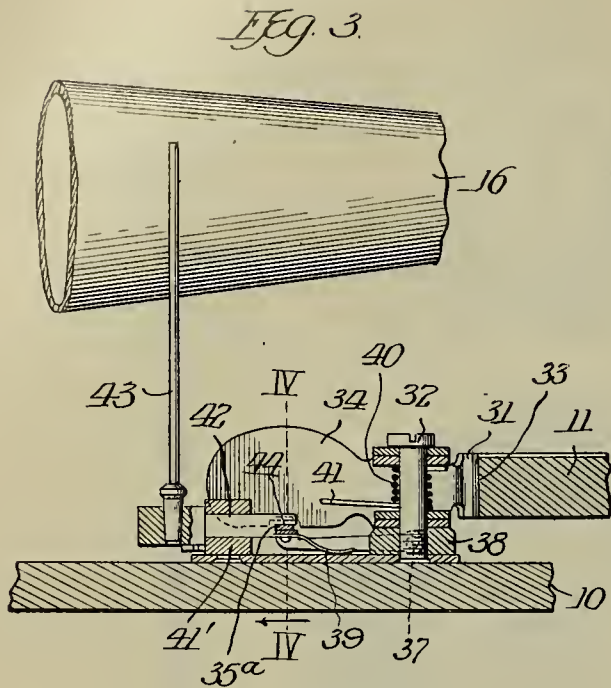
Inventor:
Oscar L. Scalbom
By attorney Paul Carpenter



O. L. SCALBOM.
STOP MECHANISM FOR GRAPHOPHONES.
APPLICATION FILED FEB. 15, 1913.

1,170,997.

Patented Feb. 8, 1916.
2 SHEETS—SHEET 2.



Witnesses
Ed. C. Driscoll -
Martha Westman

Inventor:
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By Attorney
Paul Carpenter

UNITED STATES PATENT OFFICE.

OSCAR L. SCALBOM, OF GLENVIEW, ILLINOIS.

STOP MECHANISM FOR GRAPHOPHONES.

1,170,997.

Specification of Letters Patent.

Patented Feb. 8, 1916.

Application filed February 15, 1913. Serial No. 748,605.

To all whom it may concern:

Be it known that I, OSCAR LARS SCALBOM, a citizen of the United States, and a resident of Glenview, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Stop Mechanisms for Graphophones, of which the following is a specification.

My present invention relates in general to sound reproducing devices and more particularly to devices of this class employing a record member having a groove, a reproducer needle, and driving mechanism for moving the record relatively to the reproducer needle, and has special reference to the provision of improved means for stopping the movement of the record relatively to the needle, at the time the reproduction of the record is completed.

I am aware that it has heretofore been proposed to automatically cut off the driving mechanism of phonographs upon completion of the reproduction of the record, such cut off devices, however, being directed to controlling the driving mechanism directly, instead of acting upon the record member or its support as proposed by me.

The principal objects of my present invention are the provision broadly of improved means acting directly upon the record member or its support for stopping the movement thereof upon completion of the reproduction of the record; the provision of means controlled by the movement of the record member for stopping the movement thereof upon completion of the reproduction of the record; the provision of braking means acting directly upon the record member or its support for stopping the movement thereof upon completion of the reproduction of the record; the provision in a graphophone of braking mechanism acting upon the record and means for actuating said braking mechanism controlled by guide means carried by the record; the provision in an apparatus of the character referred to of resilient braking mechanism whereby the movement of the record member may be gradually cut off without shock to the reproducing mechanism; the provision of means for forming the controlling guide on the record member; the provision of means for preventing abrasion of the record center; together with

such further objects as may hereinafter appear.

In attaining the stated objects and such additional benefits and advantages as may be below disclosed I have provided a construction illustrated in the accompanying drawings, wherein—

Figure 1 is a plan view of a phonograph embodying my present improvements in a preferred form; Fig. 2 is a side elevational view of the structure of Fig. 1 from the left hand side; Fig. 3 is a sectional view taken on the line III—III of Fig. 1, illustrating details of the brake mechanism; Fig. 4 is a sectional view taken on the line IV—IV of Fig. 3; Figs. 5 and 6 are respectively plan and edge views of means employed by me for preventing abrasion of the record center; Fig. 7 is a plan view of a preferred form of means employed by me for forming the deflecting guide; and Fig. 8 is an edge-wise view of the device of Fig. 7 in position upon a record disk preparatory to forming said guide.

Referring first to Figs. 1 and 2, it will be observed that I have here illustrated somewhat diagrammatically a phonograph including a casing 10, a revoluble record supporting base 11 rotatable in the customary manner by a vertical shaft carried in a journal 12, and driven by any suitable driving mechanism contained in the casing 10, but not shown, a record 14 mounted on the base 11 and held in position thereon by a set screw 15, a portion 16 of a horn supported from the casing 10 by a bracket 17, and carrying a sound box 18, provided with a reproducer needle 19 engaging the spiral record groove 20 of the member 14. The construction just described, since it is well known in the art requires no further detailed explanation save in connection with my present improvements which I will now proceed to describe.

Still referring to Fig. 1 it will be observed that in carrying out my present improvements I mount on the casing 10 at some convenient point adjacent the part 16 of the horn, a brake device 21 adapted to act upon the record member 14, or upon its supporting base 11, and preferably upon the periphery of the member 11, such brake device 21 being provided with suitable actuating mechanism to be hereinbelow de-

scribed in connection with Figs. 3 and 4; and, further, that I provide upon the record member 14 suitable guiding or deflecting means whereby the reproducer needle 19 may be diverted from the groove 20, and thereby deflected from its normal course of movement, carrying with it the sound box 18 and such parts as may be connected therewith, and thereby actuate the brake device 21.

The preferred form of guiding or deflecting means employed by me is a groove 22 which should be positioned at the end of the record groove, and may be given the desired form in the convenient manner to be below described in connection with the device of Figs. 7 and 8, and where such a groove is used, a protecting device 23 such as will be below described in connection with Figs. 5 and 6 may be conveniently (though not necessarily) employed to prevent abrasion of the record center and the consequent production of discordant sounds.

Referring now more particularly to Figs. 3 and 4 wherein I have illustrated the details of construction of a brake device indicated at 21 in Figs. 1 and 2, it will be observed that in the preferred form of brake device here shown I mount on the casing 10 a supporting base 30 carrying a pair of shoes 31—31 which are pivoted for horizontal movement about a center post 32 which has threaded engagement with the base 30. Each shoe is preferably provided with a leather facing indicated at 33 adjacent the point where it bears on the rotatable support 11 to the end that when the device is actuated the rotation of the support may be stopped without shock, and each of the members 31 is further provided with extensions 34 whereby the shoes 31 may be conveniently withdrawn from contact with the member 11 preparatory to restarting the reproducing movement.

For holding the shoes 31 out of contact with the member 11 during the reproduction of the record I employ a dog 35^a having oppositely disposed catches 35—35 (see Fig. 4), such dog being carried by arms 36 pivoted at 37 to a supporting member 38 which is retained in position by the center post 32 above referred to. For sustaining the dog in such a manner that the catches 35 are in position to engage the extensions 34 when they are moved to the position shown in Fig. 4 and thereby hold the brake device 21 out of operative relation to the supporting base 11, I employ a supporting spring 39, and for normally forcing the extensions 34 apart and thereby forcing the shoes 31 into contact with the record 11 I employ a coiled spring 40 whose respective ends 41 (one not shown) bear against such extensions 34.

For depressing the dog and thereby causing disengagement of the catches 35 from

the extensions 34 and thereby permitting the application of the shoes 31 to the base 11 with consequent stoppage of the record upon the completion of the reproduction of the record, I mount on the base 30 a supporting block 41' wherein there is mounted for oscillatory movement a shaft 42 carrying at one end a trigger 43, in the present form of my device operable by the movement of the horn portion 16, in the manner to be below described, the shaft 42 having at its opposite end a preferably flat cam surface 44, contacting with the dog 35^a and so arranged that any material movement of the cam and thence of the dog will withdraw the catches 35 from contact with the pieces 34 thereby releasing the brake shoes 31, which the spring 40 then forces into contact with the base 11 and stopping the movement of the record 14 carried thereby.

When my present improvements are employed in phonographs as they are commonly constructed at this day, which includes the utilization of a composition disk record member which is often provided with a papier mâché center, and since my improvements contemplate the deflection of the reproducer toward such center, thereby tending toward a possibility of defacement of such center with consequent production of discordant sounds, I preferably employ the protecting disk 50 which may be a piece of thin sheet steel such as is indicated in Fig. 5, formed with a notch 51 in the periphery of the disk in order to guide the reproducer needle 19 on to the flat surface of the disk.

In order to secure the most efficient results from phonographs employing my present improvements, I find it highly desirable, though not absolutely essential, that the deflecting groove 22 bear substantially the relation to the sound producing groove 20 shown in Fig. 1, that is, that the angle formed by the extension of the groove 22 with the groove 20, be substantially 15 degrees, and inasmuch as the sound reproducing groove 20 differs in various records, according to the length thereof, I have found it most desirable to provide means for insuring a constant relation between the groove 22 and the groove 20. To this end I have provided the templet shown at 52 (Fig. 7) wherein I employ a piece of flat sheet steel forming the same with a guide edge 53 and a center pin 54 for engaging the central aperture of the record 14 (see Fig. 8), the leg 55 of the templet being provided with a number of finger holds 56 whereby it may be easily adjusted with relation to the end of the groove 20, and firmly held in such position while the groove 22 is being formed in any convenient manner such as by the use of a sharp pointed scraper. Since the groove 20 is in the form of a spiral, and it is desirable to maintain the

groove 22 in a constant angle to all of the helices of the spiral 20 the form of the edge 53 of the templet 52 is preferably a curve in the nature of a portion of a logarithmic spiral.

In the operation of phonographs embodying my present improvements, the record having been provided with suitable deflecting means, such as the groove 22, it is placed in position upon the rotatable base 11 in the customary manner and the brake device moved to the position shown in Fig. 1. Reproduction of the record will then be commenced and carried on in the customary manner until such time as the reproducer needle 19 strikes the groove 22 when it will be deflected away therefrom and upon to the disk 50, the horn portion 16 being carried thereby to the position indicated in dotted lines in Figs. 1 and 4, thus moving the operating lever 43 of the brake device 21 to the position shown in dotted lines in Fig. 4, lowering the dog 35, and permitting the application of the brake shoes 31 to the margin of the member 11, thus stopping the movement of the record. Upon resetting the reproducing needle in the groove 20 of the same or another record, the brake device 21 may be released by drawing the extensions 30 34 together, when the action just described will be repeated.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is:

1. A brake device comprising, in combination, a pair of oppositely disposed spring applied brake shoes, spring held detent means for normally holding said shoes in a predetermined position, and means for releasing said detent means whereby said brake shoes are released and may thereupon be actuated by said spring.

2. A brake device, comprising, in combination, a pair of oppositely disposed members pivoted intermediate their ends, each carrying at one end a brake shoe and the opposite end being provided with spring actuating means for causing the first mentioned ends to approach, spring held detent means for normally holding said shoes in separated position, and means for releasing said detent means whereby said shoes are released and may thereupon be actuated by said actuating means.

3. A brake device comprising, in combination, a spring applied brake shoe, spring held detent means for normally holding said shoe in a predetermined position, and a cam for moving said detent and thereby releasing said brake shoe, whereby it may be actuated by said actuating means.

4. A brake device comprising, in combination, a spring applied brake shoe, pivoted detent means for normally holding said shoe in a predetermined position, and a cam for

moving said detent and thereby releasing said brake shoe, whereby it may be actuated by said spring actuating means.

5. A brake device comprising, in combination, a spring applied brake shoe, a detent for normally holding said shoe in a predetermined position, a cam adapted to move said detent, and a trigger for moving said cam and thereby said detent, whereby said brake shoe is released and may thereupon be actuated by said spring brake applying means.

6. A brake device comprising a frame, a vertical pivot, a horizontal pivot lying in substantially the same vertical plane as said vertical pivot, a brake member mounted on said vertical pivot, a spring for said brake member, a detent for holding said member in retracted position, and an arm on said horizontal pivot adapted to release said detent.

7. A brake device comprising, in combination, a pair of pivotally mounted members, a common pivot therefor, brake shoes at one end of said members, projecting portions at the other end of said members adapted to be grasped by the fingers, a spring adapted normally to separate said portions, a detent for holding said portions in retracted position, and a pivoted arm adapted to release said detent.

8. A brake device comprising, in combination, a pivotally mounted brake shoe, a vertical pivot for said brake shoe, a detent for holding said brake shoe in retracted position, a pivotally mounted arm for releasing said brake shoe, a pivot for said arm, and a cam on said last-mentioned pivot for moving said detent out of holding position.

9. A brake device comprising, in combination, a surface to be braked, a pivoted member, a brake shoe on the end of said member, the distance between the braking surface of said shoe and the pivot of said member being only slightly greater than the perpendicular distance between the pivot and the surface to be braked, and a spring acting on said member adapted to press said brake shoe into contact with said last mentioned surface.

10. A brake device comprising, in combination, a surface to be braked, a pivoted member, a brake shoe on the end of said member, the distance between the braking surface of said shoe and the pivot of said member being only slightly greater than the perpendicular distance between the pivot and the surface to be braked, and a spring acting on said member adapted to press said brake shoe into contact with said last mentioned surface, and releasable means for holding said brake shoe out of contact with the surface to be braked.

11. A brake device comprising, in combination, a surface to be braked, a pivoted

member, a brake shoe on the end of said member, the distance between the braking surface of said shoe and the pivot of said member being only slightly greater than the
 5 perpendicular distance between the pivot and the surface to be braked.

12. A brake device comprising, in combination, a member pivoted intermediate its ends, a brake shoe at one end, a spring acting on said member adapted to press the
 10 brake shoe against the surface to be braked, a portion at the other end adapted to be grasped by the fingers for moving said member in opposition to said spring, and means
 15 for releasably holding said member in such retracted position.

13. A brake device comprising, in com-

bination, a pair of oppositely disposed members pivoted intermediate their ends, each carrying at one end a brake shoe and at the
 20 opposite end a portion adapted to be grasped by the fingers for retracting the brake shoes, a spring acting on said members adapted to press said brake shoes against the surface
 25 to be braked, and means for releasably holding said member in retracted position.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

OSCAR L. SCALBOM.

Witnesses:

MARTHA WESTMAN,
 PAUL CARPENTER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND RECORDING AND REPRODUCING
MACHINE,

#1,171,082-----B. A. Baer,

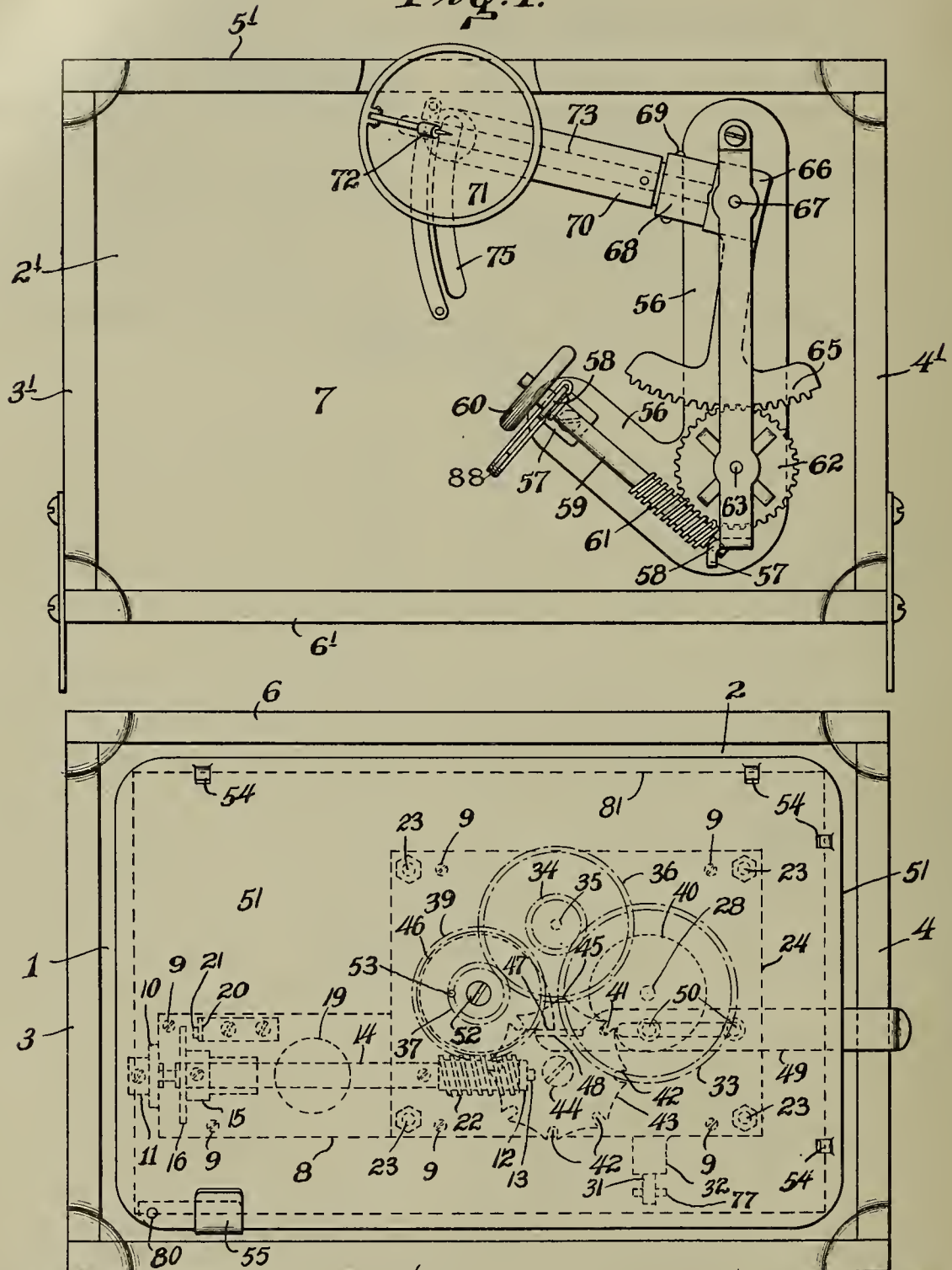
Patented-Feb. 8th, 1916.
Filed-March 30th, 1909;

B. A. BAER.
SOUND RECORDING AND REPRODUCING MACHINE.
APPLICATION FILED MAR. 30, 1909.

1,171,082.

Patented Feb. 8, 1916.
2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

Daniel Webster, Jr.
I Shwartz

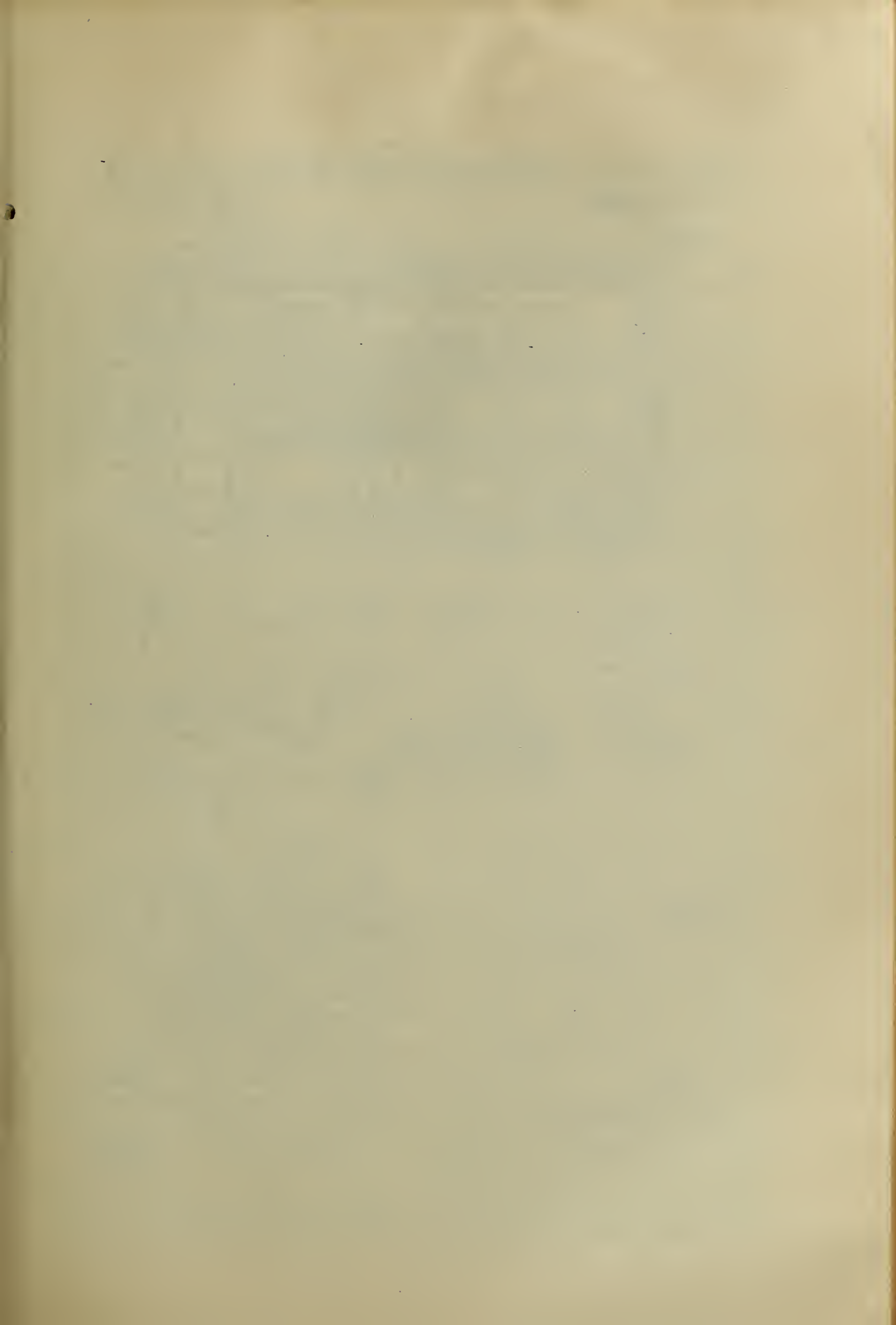
INVENTOR

Berthold H. Baer.

BY

J. S. Premer

ATTORNEY



B. A. BAER.
SOUND RECORDING AND REPRODUCING MACHINE.
APPLICATION FILED MAR. 30, 1909.

1,171,082.

Patented Feb. 8, 1916.

2 SHEETS—SHEET 2.

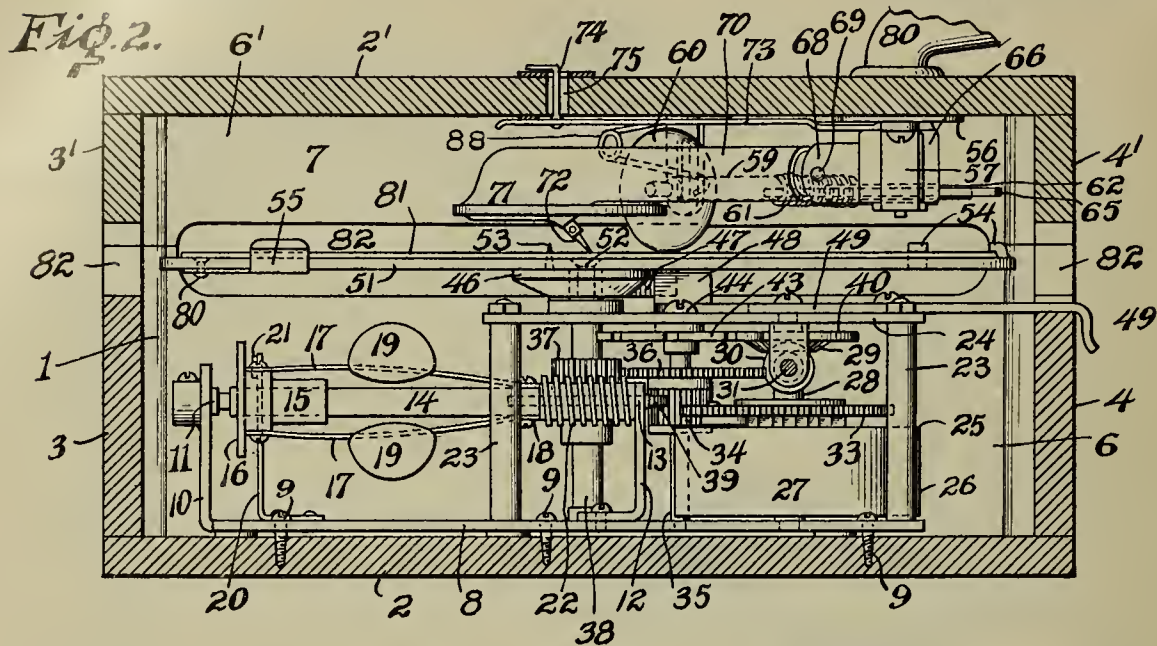


Fig. 6.

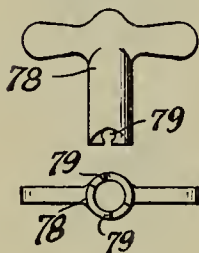


Fig. 3.

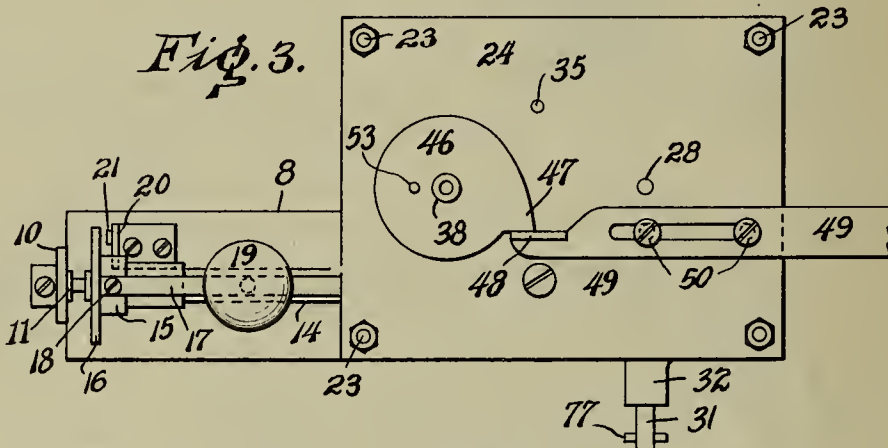


Fig. 5.

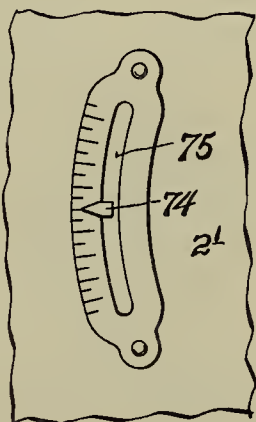
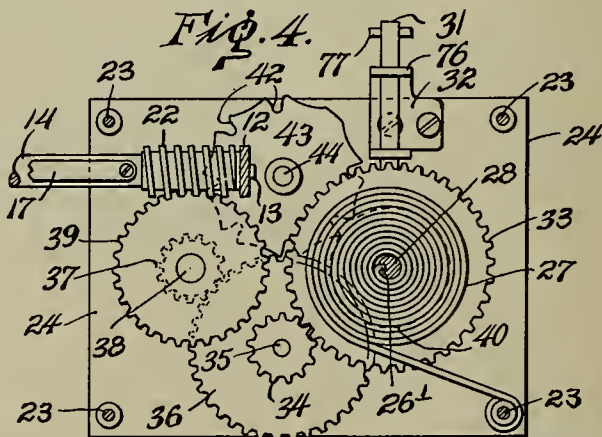


Fig. 4.



WITNESSES

Daniel Webster, Jr.
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BY

J. C. Prentiss

ATTORNEY

UNITED STATES PATENT OFFICE.

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SOUND RECORDING AND REPRODUCING MACHINE.

1,171,082.

Specification of Letters Patent.

Patented Feb. 8, 1916.

Application filed March 30, 1909. Serial No. 486,776.

To all whom it may concern:

Be it known that I, BERTHOLD A. BAER, a citizen of the United States, residing in Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sound Recording and Reproducing Machines, of which the following is a specification.

10 My invention relates to sound recording and reproducing machines, and the object thereof is to produce, first—a machine wherein a card or similar article can be mounted for the purpose of having a record
15 produced thereon by a moving needle point which is vibrated by the action of sound waves; second—a machine wherein a record is produced on a card or similar article by a recorder and the identical record repro-
20 duced by substituting a reproducer for the recorder; third—a machine for producing a record on a card or similar article and at the same time marking the card for the purpose of fixing the position for the or-
25 derly reproduction of the record from the card; fourth—a machine wherein the recording and the reproducing can be interrupted, stopped and continued at the will of the operator; fifth—a machine provided
30 with an index for informing the operator of the position of the record on the card.

With these and other objects in view my invention consists in the construction, combination and arrangement of parts as will be hereinafter more fully described and claimed and illustrated in the accompanying drawings, it being understood that changes in form, size, shape and minor details may be made within the scope of the claims without departing from the spirit or sacrificing any of
40 the advantages of my invention.

In the accompanying drawings, Figure 1, is a plan view of the machine with the lid open; Fig. 2, is an elevation with the lid
45 down; Fig. 3, is a plan view of the governing mechanism; Fig. 4, is a plan view of the operating mechanism; Fig. 5, is a plan view of the indicator; and Fig. 6, is a key.

Similar figures refer to similar parts
50 throughout the several views.

A box 1, consists of a bottom 2, walls 3, 4, 5, 6, and is provided with a lid 7, consisting of a top 2', and walls 3', 4', 5', 6'. In-

side the box 1, is mounted a base-plate 8, secured to its bottom 2, as at 9. The plate 55 8, supports a pedestal 10, provided with a bearing 11, and with a pedestal 12, provided with a bearing 13. In the bearings 11, and 13, is journaled a shaft 14. On shaft 14, is slidably mounted a collar 15, carrying a
60 disk 16, facing the pedestal 10. To the collar 15, are attached two spring-strips 17, 17, which are attached to the shaft 14, at 18. Two hemispheres 19, 19, are centrally
65 mounted on the strips 17, 17, constituting a ball governor. Between the disk 16, and the governor, is a pedestal 20, supporting a shoe 21, facing the disk 16. On the shaft 14, and near the pedestal 12, is mounted a worm
70 22. Within the box 1, are mounted four posts 23, for supporting a plate 24. On one of the posts 23, as at 25, is hooked one end 26, of a spring coil 27, whose other end 26',
75 is fastened to a pin 28, on which is mounted a bevel-gear 29, meshing with a bevel-gear 30, mounted on a pin 31, in a key-hole 76, of a bracket 32, for winding up the spring 27. On pin 28, is mounted a gear 33, meshing
80 with a pinion 34, mounted on a pin 35. On pin 35, is also mounted a gear 36, meshing with a pinion 37, mounted on a pin 38. On pin 38, is also mounted a worm-gear 39, meshing with the shaft-worm 22. On pin
85 28, is also mounted a cog-wheel 40, provided with a single tooth 41, to engage successively pockets 42, of a disk 43, mounted on a pin 44, supported from the plate 24, for causing
90 disk 43, to turn until a lug 45, is reached.

On the top of plate 24, and over pin 38, is mounted a disk 46, provided with a lug
95 47, to be held by a catch 48, of a bar 49, slidably mounted on plate 24, by means of guides 50, 50. A card-holder 51, is mounted over disk 46, by a screw 52, and over a pin 53, projecting from disk 46, and through
100 the card-holder 51. The card-holder 51, is provided with fixed pockets, 54, and with a swinging pocket 55, pivoted on a pin 80.

On the inside of the cover 7, and to the top 2', is fastened a bracket 56, supporting
105 pedestals 57, 57, provided with bearings 58, 58, for a shaft 59, on which is mounted a friction disk 60, and a worm 61. A worm-gear 62, meshing with worm 61, is mounted on a pin 63, pivoted in the bracket 56, and also
110 meshes with a gear-sector 65, attached to a

hub 66, mounted on a pin 67, pivoted in the bracket 56. The hub 66, carries a socket 68, in which is pivoted a pin 69, on which is mounted a tubular arm 70, for supporting a sound-box 71, which carries a recording or reproducing stylus 72. To the hub 66, is also fastened an arm 73, provided with an index 74, which projects through a slot 75, in the top 2'.

A key 78, for winding up spring 27, is provided with notches 79, 79, for engaging a pin 77, projecting through pin 31, for turning pin 31, in a direction to cause the spring 27, to wind up, and becoming disengaged when an attempt is made to turn the key in the wrong direction.

For operating the machine, insert the key in the key-hole and turn pin 32. Gear 30, mounted on pin 31, transmits the motion through gear 29, to pin 28, winding up the spring 27. The wheel 40, mounted on pin 28, revolves, and its tooth engages successively the pockets of disk 43. When lug 45, is reached, the tooth 41, on wheel 40, is prevented from passing it, and serves as a safety device for the spring 27. After the spring is wound up, a specially prepared card as 81, is mounted on the card-holder 51, inserting its three corners in pockets 54. It is then pressed against the card-holder until 53 is forced through it making a permanent hole in the card to indicate the position of the card when mounted for reproducing. The pivoted pocket 55, is then swung around to hold down the free corner of the card. The lid is now put down which brings the friction disk 60, in contact with the card, and the recorder in contact with the prepared surface of the card. Sliding bar 49, is now pulled outwardly until lug 47, of disk 46, is released, which releases spring 27. The spring commences to unwind, transmitting its motion through pin 28, gear 33, through pinion 34, gear 36, pinion 37, worm gear 38, and worm 22 to shaft 14. The speed is regulated by the governor-balls, the disk 16, in connection with shoe 21, acting as a brake. Pinion 37, mounted on pin 38, on which disk 46, is mounted, causes the card-holder 51, and the card 81, mounted thereon, to revolve under the recorder or reproducer, to either produce a record on the card or to reproduce from the card as the case may be. As the card rotates, the friction disk 60, held in frictional contact therewith by a spring 88, transmits motion to worm gear 62, through shaft 59, and worm 61, mounted thereon. Gear 65 transmits the motion to the recorder or to the reproducer, as the case may be, connected therewith through arm 70, socket 68 and hub 66, and at the same time index 74, indicates the position of the recorder or of the reproducer on the card. To stop the operation all that is

necessary is to push bar 49, inwardly until catch 48, is in the way of lug 47.

The box itself is of the same shape as the card, and to permit of the free rotation of the card is provided with slots as at 82.

The recorder is made to vibrate by the sound produced in a horn, as 80, connected with the hub 66, and transmitted through the pivoted arm 70, to sound box 71. The vibrating recorder produces impressions upon the prepared surface of the card. When the card with such an impressed record is mounted in such a box and a reproducer substituted for the recorder, it sets up vibrations in the sound-box 71, which are transmitted through the horn. When the spring 27, is unwound to its utmost capacity the lug 45, of disk 43, holds the tooth 41, of wheel 40, preventing any further operation.

Having thus described my invention what I claim as new and desire to protect by Letters Patent, is,—

1. The combination, in a sound recording and reproducing machine, of a box, a card carrier rotatably mounted in said box, a cover for the box, said card carrier being wholly independent of the cover, a friction disk carried by the cover and revolubly supported thereby, and a sound-box carried by said cover in operative connection with and adapted to be fed by said disk, said disk being arranged to be rotated by the carrier when the cover is down on the box.

2. A sound recording and reproducing machine comprising a box, a carrier rotatably mounted therein adapted to carry a card, a cover for the box, a bracket mounted on the inside of the cover, a friction disk revolubly supported thereby and adapted to be rotated by the card when the cover is down on the box, a sound box pivotally supported by said bracket, a gear sector adapted to move the sound box relatively to the carrier, a shaft carrying the friction disk provided with a worm, and a gear in mesh with said sector and worm.

3. A sound recording and reproducing machine, comprising a box provided with a revolubly mounted carrier, a cover therefor provided with a friction disk adapted to be revolved by the carrier, a sound box suspended from the cover and adapted to be moved by the disk relatively to the carrier, a needle point suspended from the sound box, a gear, a shaft carrying the friction disk and provided with a worm in mesh with said gear, and a sector in mesh with said gear adapted to cause said needle to move over the surface of the carrier.

4. A sound recording and reproducing machine, comprising a box provided with a revoluble carrier, a cover therefor provided with a disk adapted to be rotated by the

carrier, a sound box above the carrier
adapted to be moved by the disk relatively
to the carrier, a needle point suspended from
the sound box over the carrier, and means
5 above the cover adapted to indicate the posi-
tion of the needle point relatively to the car-
rier.

In witness whereof I have hereunto signed
this specification in the presence of two sub-
scribing witnesses.

BERTHOLD A. BAER.

Witnesses:

EMANUEL KLINE,
WM. PORTNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

GRAPHOPHONE PATENT.

HOLDER FOR RECORDS AND THE LIKE,
1,171,118-----F. W. Harris,
Patented-February 8th, 1916.
Filed-April 21st, 1915.

F. W. HARRIS.
 HOLDER FOR RECORDS AND THE LIKE.
 APPLICATION FILED APR. 21, 1915.

1,171,118.

Patented Feb. 8, 1916.

2 SHEETS—SHEET 1.

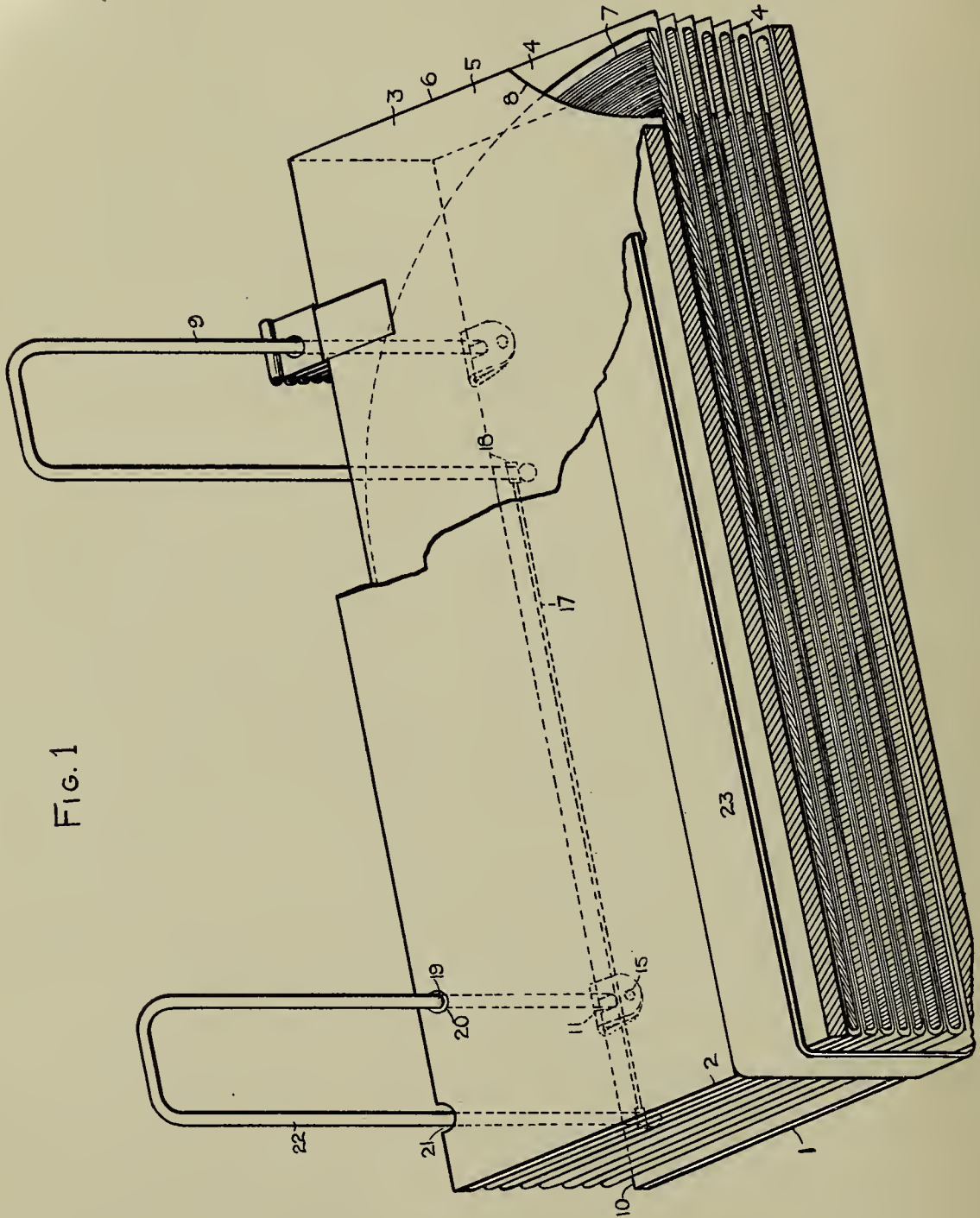


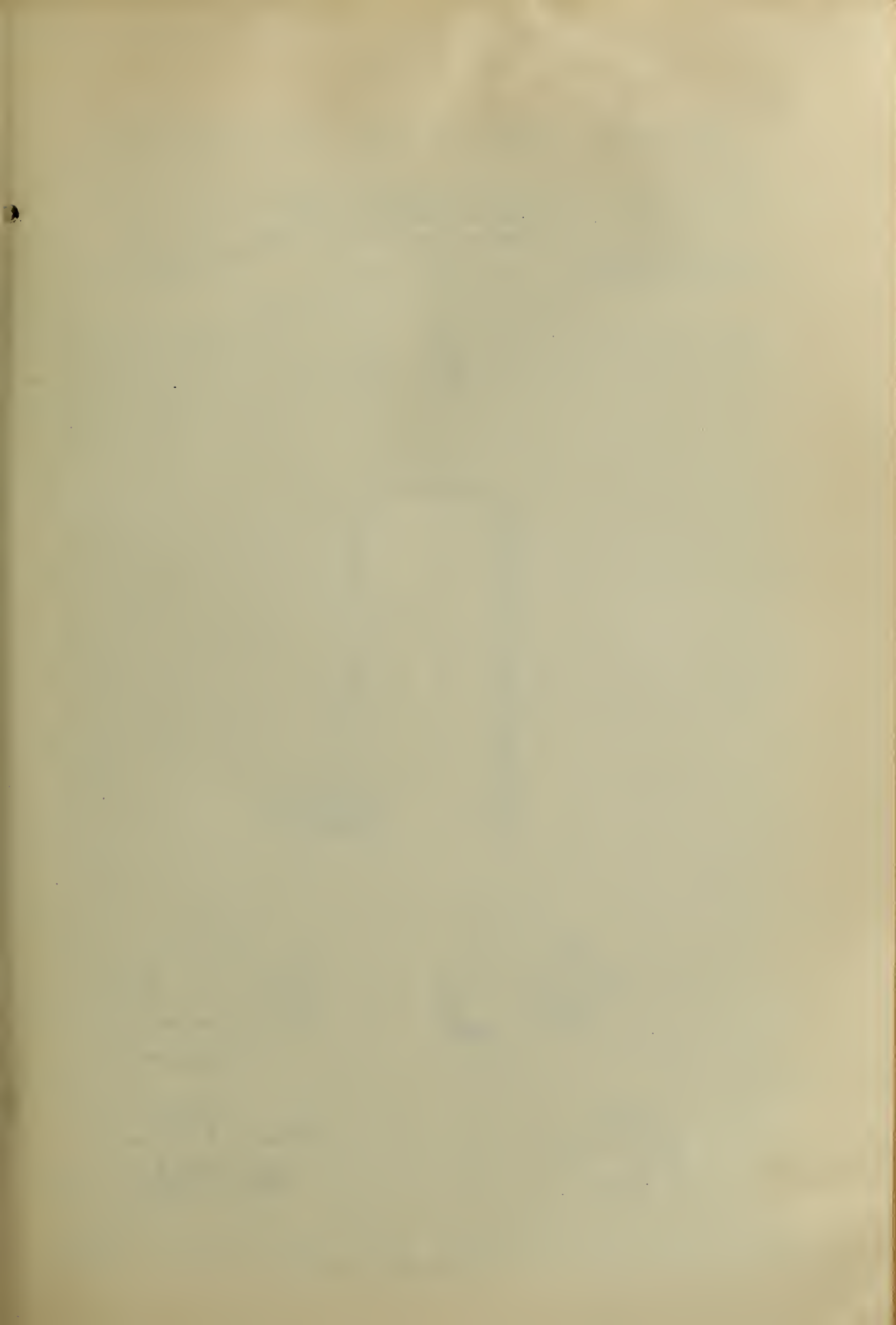
FIG. 1

WITNESSES:

H. J. Spruiell
L. Levitt

INVENTOR

Frank W. Harris
 BY *Robert S. Blair*
 ATTORNEY



F. W. HARRIS.
HOLDER FOR RECORDS AND THE LIKE.
APPLICATION FILED APR. 21, 1915.

1,171,118.

Patented Feb. 8, 1916.
2 SHEETS—SHEET 2.



FIG. 4

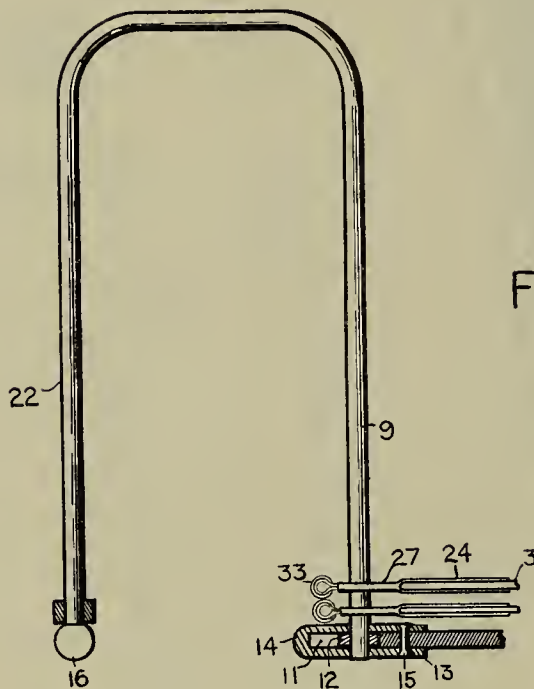


FIG. 2

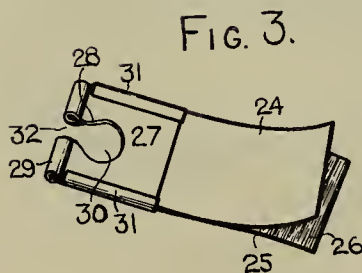


FIG. 3

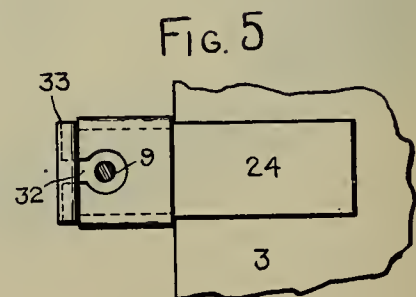


FIG. 5

WITNESSES:

H. J. Brunjes
L. Levit

INVENTOR
Frank W. Harris
BY *Robert S. Blair*
ATTORNEY

UNITED STATES PATENT OFFICE.

FRANK W. HARRIS, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF TO JOHN PFLEGING, OF BROOKLYN, NEW YORK.

HOLDER FOR RECORDS AND THE LIKE.

1,171,118.

Specification of Letters Patent.

Patented Feb. 8, 1916.

Application filed April 21, 1915. Serial No. 22,728.

To all whom it may concern:

Be it known that I, FRANK W. HARRIS, a citizen of the United States, and residing at Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Holder for Records and the like, of which the following specification is a full disclosure.

This invention relates to holders and with regard to certain more specific features, to portable holders for flat phonographic records.

One of the objects thereof is to provide a device of the above type of simple and durable construction and convenient in use.

Another object is to provide a practical and inexpensive device of the above type in which the number of records is readily varied and in which the records are securely held in position.

Other objects will be in part obvious from the annexed drawings and in part indicated in connection therewith by the following analysis of this invention.

This invention accordingly consists in the features of construction, combinations of parts, and in the unique relations of the members and in the relative proportioning and disposition thereof; all as more completely outlined herein.

In the accompanying drawings, in which is shown one of various possible embodiments of this invention, Figure 1 is a sectional perspective, certain portions being broken away in order to show the construction more clearly. Fig. 2 is a view of a guide rod with associated parts. Fig. 3 is a perspective view of a retaining device. Fig. 4 is a similar view of a locking slide for the device shown in Fig. 3. Fig. 5 is a reverse plan view of the device shown in Fig. 3, with the slide in position.

Similar reference characters refer to similar parts throughout all the views of the drawings.

Referring now to Fig. 1 of the drawings, there is shown a base or lower cover portion 1 which, in connection with the upper cover portion 2 and the devices hereinafter described, form a book-like holder for a series of paper pockets 3. Each of these pockets comprises a lower leaf 4 and an upper leaf 5 and they are connected one with another along three of their four edges, the pocket opening preferably along the line 6. Each

of these pockets, which may take the form of the envelopes in which the records are originally sold, incloses a phonographic record 7 and the upper leaf portions 5 are preferably cut away as at 8 to permit the records readily to be removed.

Mounted upon the base portion 1 are a pair of guides or uprights 9. As these guides, with their associated parts, are substantially identical, one only will be described in detail. The edge portion 10 of the base 1 is perforated or slotted as indicated in dotted lines at 11 in Fig. 1 of the drawings, and fitted within this slot is a small collar 12. Passing through this collar is the lower end of the guide 9 which is journaled in a sheet metal bearing member 13 folded about the edge of the base as at 14. This member is pinned together as by the rivet pin 15 and thus forms a firm seat within which the guide swings about an upright axis. It may here be noted that the collar 12 is forced about the lower end of guide 9 and thus holds the latter in its bearings in the member 13.

The guides 9 extend upwardly, thence horizontally and thence downwardly, assuming the device to be resting in horizontal position, and terminate in a head portion 16 as indicated in Figs. 1 and 2 of the drawings. These guides, moreover, are connected by a link 17 provided with the eye portions 18 embracing the ends of the guides and thus causing them to swing in parallel relation about their seats in the bearing members 13.

The upper cover portion 2 is perforated as indicated at 19 and provided with an eyelet 20 for each of the guides 9 to pass through. These guides normally are folded against the book as indicated in Fig. 1 of the drawings, their outer portions resting in recesses as at 21 and providing a compact disposition of the parts. When, however, it is desired to open the book, they are swung outwardly away from the rear edge of the base 1, as indicated in Fig. 2 of the drawings, and thereupon the cover 2 may be raised along the stationary portion of guides 9 and then dropped along the swinging portions 22 to expose the contents of the book and permit ready access to the records in the pockets 3. It will thus be seen that there is provided a compact and yet readily accessible form of holder, and it may be

noted that there is preferably provided a strap indicated at 23 which extends entirely about the holder and aids in holding its contents in position and may be provided with a convenient handle if desired.

The means whereby the individual pockets are mounted upon the guide rods 9 are indicated in Figs. 3, 4 and 5 of the drawings. There is provided a piece of tape folded upon itself to form the portions 24 and 25, each of which is gummed upon its inner surface as indicated at 26. The folded end of these tapes is gripped by an integral sheet metal device which is folded upon itself to form an upper section 27 and a lower section 28 integrally connected by expanded portions 29, thus providing a recess 30 with which a corresponding recess in the folded end of the tape registers. The lower section 28 is provided with side wings or extensions 31 which fold over the upper section 27 and, being stamped in position, cause the device to securely grip the tapes. The opening 30 is of such proportion as loosely to fit the guide rods 9 and is preferably provided with a slightly narrower mouth 32 through which the rods can pass. This mouth is closed by a slotted tubular slide 33 which closely fits the expanded portions 29 upon being slid over them and thus holds itself frictionally in position as indicated in Fig. 5 of the drawings. This arrangement permits the pockets 3 to be readily placed in position, as it is necessary merely to moisten the inner gummed surfaces of the tapes 24 and 25, stick them to the outer surface of the pocket 3 in which the record is sold, and by removal and replacing of the slides 33 these pockets are quickly secured to the guide rods 9. It may here be noted that the term "guide" is used throughout in a broad sense to denote any device having such supporting or guiding function as will be equivalent to this feature of the invention.

The use and action of the several features of this holder have already been referred to, but the manipulation may be briefly recapitulated as follows:—When it is desired to use the book, assuming all of the records to be in position, the guides 22 are swung outwardly from the covers and when at right angles, as indicated in Fig. 2 of the drawings, the upper cover, and in fact any desired number of the records, may be thrown over on to the guide portions 22, these parts traveling freely due to the loose fit of the eyelets 20 and openings 30. The desired record is then exposed and removed and subsequent to use the guides 22 are merely swung flat against the book and strap 23 secured in position. If it is necessary to remove one of the pockets 3 or to add a new pocket, this is readily accomplished by the manipulation of the devices shown in Figs. 3, 4, and 5 of the drawings, as already

herein described. It will thus be seen that there is provided a holder in which the several objects of this invention are achieved, and that this holder is not only of simple, compact and durable form as well as conveniently manipulated, but is well suited to meet the hardest conditions of practical use.

As many changes might be made in the above construction, and as many apparently different embodiments might be made of this invention without departing from the scope thereof, it is intended that all features herein described or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus revealed this invention, I claim as new and desire to secure the following combinations of elements, or equivalents thereof, by Letters Patent of the United States:—

1. In a device of the class described, in combination, a plurality of record-holding pockets, each complete in itself, a guide, and a plurality of devices each of which is secured to one of said pockets and is provided with means removably interlocking with said guide.

2. In a device of the class described, in combination, a pair of substantially flat members, a guide connecting said members and permitting them to swing apart, a plurality of complete pockets between said flat members, and a plurality of securing devices each of which is adhesively secured to a closed edge of one of said pockets and each of which is provided with means removably interlocking with said guide.

3. In a device of the class described, in combination a pair of substantially flat members, a pair of guides connecting said members and permitting them to swing apart, and a plurality of securing devices respectively connected upon said guides in pairs in removable interlocking relation therewith and each provided with a pair of narrow flexible tapes adapted to receive and make adhesive connection with a record-receiving pocket and further provided with a locking member adapted to hold it in said interlocking relation.

4. In a device of the class described, in combination, means comprising a pair of superposed tapes having adhesive matter upon their adjacent surfaces and forming a recess for removable connection with a rod, and means adapted removably to close the open end of said recess.

5. In a device of the class described, in combination, a plurality of substantially flat members, a pair of guides secured to one of said members and having the other member movably mounted thereon to swing away from the first member, said guides being mounted to swing toward or away from the

edges of said flat members when the latter are in superimposed position, means connecting the swinging portions of said guides one with another to cause them to swing in substantially parallel planes, and means adapted to support records on said guides between said members.

6. In a device of the class described, in combination, a plurality of substantially flat members, a pair of guides secured to one of said members and having the other member movably mounted thereon to swing away from the first member, said guides being mounted to swing toward or away from the edges of said flat members when the latter are in superimposed position, means connecting the swinging portion of said guides one with another to cause them to swing in substantially parallel planes, and means adapted to support records on said guides between said members, the edges of one of said flat members being recessed to receive the swinging portions of the guides.

7. In a device of the class described, in combination, a pair of superposed tapes having adhesive matter upon their adjacent surfaces, a relatively rigid device secured to one end of said pair of tapes and forming a recess adapted to make removable connection with a rod, and removable means adapted to close the open end of said recess.

8. In a device of the nature described, in combination, a supporting member, means comprising a pair of parts respectively disposed on opposite sides of said member adjacent an edge thereof and connected one with the other, and an upright member connected with said parts and passing through said first member.

9. In a device of the nature described, in combination, a supporting member, means comprising a pair of parts respectively disposed on opposite sides of said member adjacent an edge thereof and connected one with the other, and an upright member journaled in said parts to swing about its axis and passing through said first member.

10. In a device of the nature described, in combination, a supporting member, means comprising a pair of parts respectively disposed on opposite sides of said member adjacent an edge thereof and connected one with the other, an upright member journaled in said parts to swing about its axis and passing through said first member, and a collar tightly fitted upon said upright

member between the parts in which it is journaled.

11. In a device of the class described, in combination, a pair of superimposed tapes having adhesive matter upon their adjacent surfaces, and a relatively rigid device secured to one end of said pair of tapes and provided with means adapted to make removable connection with a rod.

12. In a device of the class described, in combination, a pair of superimposed tapes having adhesive matter upon their adjacent surfaces, and a device secured to one end of said pair of tapes and provided with means adapted to make removable connection with a rod, said last means comprising a bifurcated part adapted to embrace the rod and a sliding member connecting the bifurcations about the rod.

13. In a device of the class described, in combination, means adapted to make attachment with a record receiving pocket, and a device secured to said attaching means and comprising a bifurcated part adapted to receive a supporting or guiding rod and a slide adapted to connect said bifurcations about said rod.

14. In a device of the class described, in combination, means adapted to make attachment with a record receiving pocket, a sheet metal member having a portion gripping said attaching means and an extended bifurcated portion, the ends of each bifurcation being expanded in size, and a slide adapted to fit over said expanded portions and connect said bifurcations.

15. In a device of the class described, in combination, means adapted to make attachment with a record receiving pocket, a sheet metal member having a portion gripping said attaching means and an extended bifurcated portion, the ends of each bifurcation being expanded in size, and a slide adapted to fit over said expanded portions and connect said bifurcations, said attaching means comprising a pair of superimposed tapes and said sheet metal device being formed integral and bent into shape.

In witness whereof, I hereunto subscribe my name, as attested by the two subscribing witnesses.

FRANK W. HARRIS.

Witnesses:

R. S. BLAIR,
H. J. BRUNGES.

The first of these is the fact that the
 system is not a simple one, but a
 complex one, involving many factors
 which are not yet fully understood.
 The second is that the system is not
 a static one, but a dynamic one, in
 which the various factors are constantly
 changing and interacting with each
 other. The third is that the system is
 not a closed one, but an open one, in
 which the various factors are constantly
 exchanging matter and energy with
 the environment. The fourth is that
 the system is not a linear one, but a
 non-linear one, in which the various
 factors are interacting in a complex
 manner. The fifth is that the system
 is not a deterministic one, but a
 probabilistic one, in which the various
 factors are interacting in a way that
 cannot be predicted with certainty.
 The sixth is that the system is not a
 simple one, but a complex one, in
 which the various factors are constantly
 changing and interacting with each
 other. The seventh is that the system
 is not a static one, but a dynamic one,
 in which the various factors are constantly
 changing and interacting with each
 other. The eighth is that the system
 is not a closed one, but an open one,
 in which the various factors are constantly
 exchanging matter and energy with
 the environment. The ninth is that
 the system is not a linear one, but a
 non-linear one, in which the various
 factors are interacting in a complex
 manner. The tenth is that the system
 is not a deterministic one, but a
 probabilistic one, in which the various
 factors are interacting in a way that
 cannot be predicted with certainty.

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 probabilistic one, in which the various
 factors are interacting in a way that
 cannot be predicted with certainty.

MEANS FOR AUTOMATICALLY STOPPING THE MOTORS
OF TALKING MACHINES,

1,172,304-----L. Norman,

Patented-February 22nd, 1916.

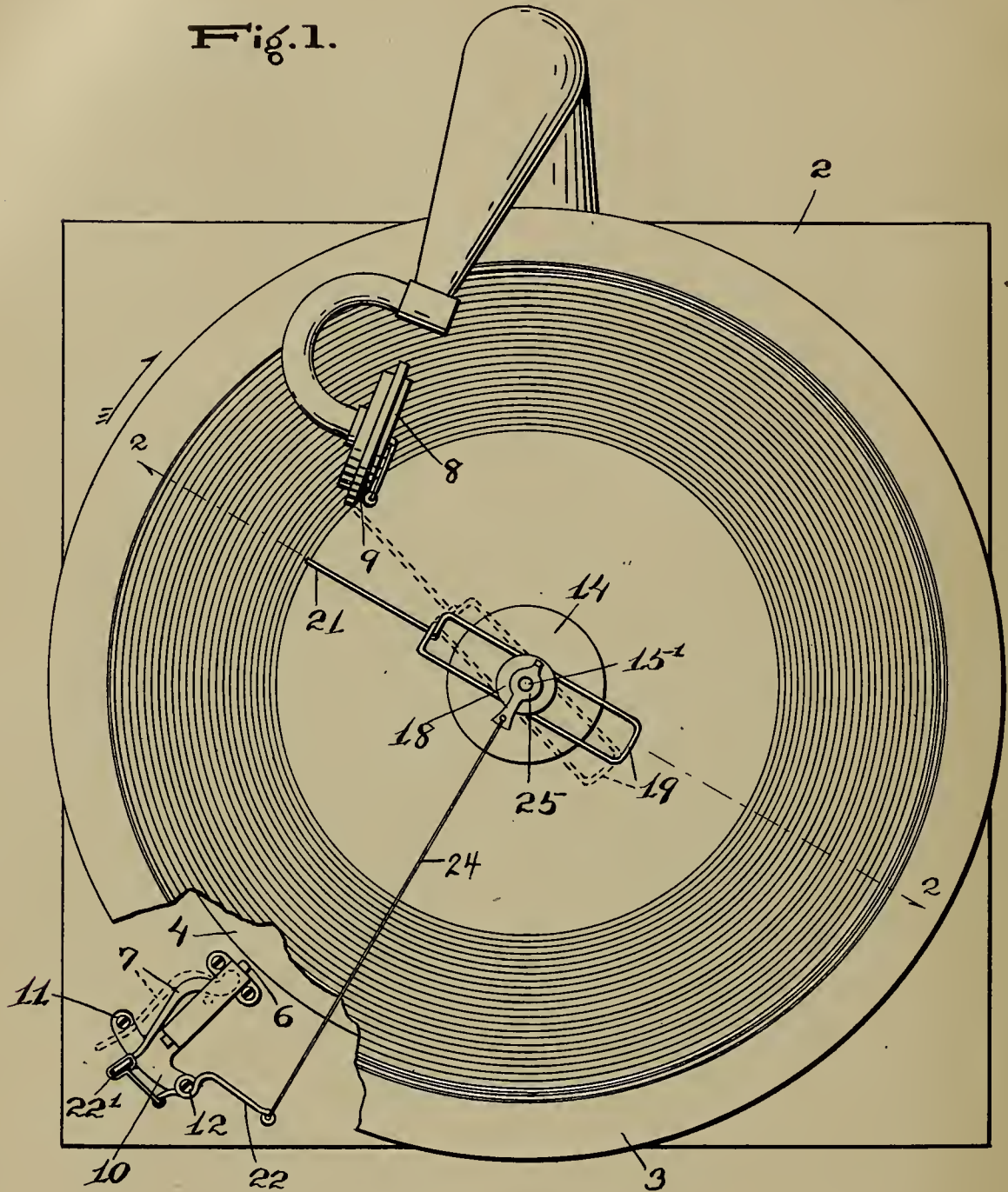
Filed-February 5th, 1915.

L. NORMAN.
 MEANS FOR AUTOMATICALLY STOPPING THE MOTORS OF TALKING MACHINES.
 APPLICATION FILED FEB. 5, 1915.

1,172,304.

Patented Feb. 22, 1916.
 2 SHEETS—SHEET 1

Fig. 1.



Inventor

Ludwig Norman

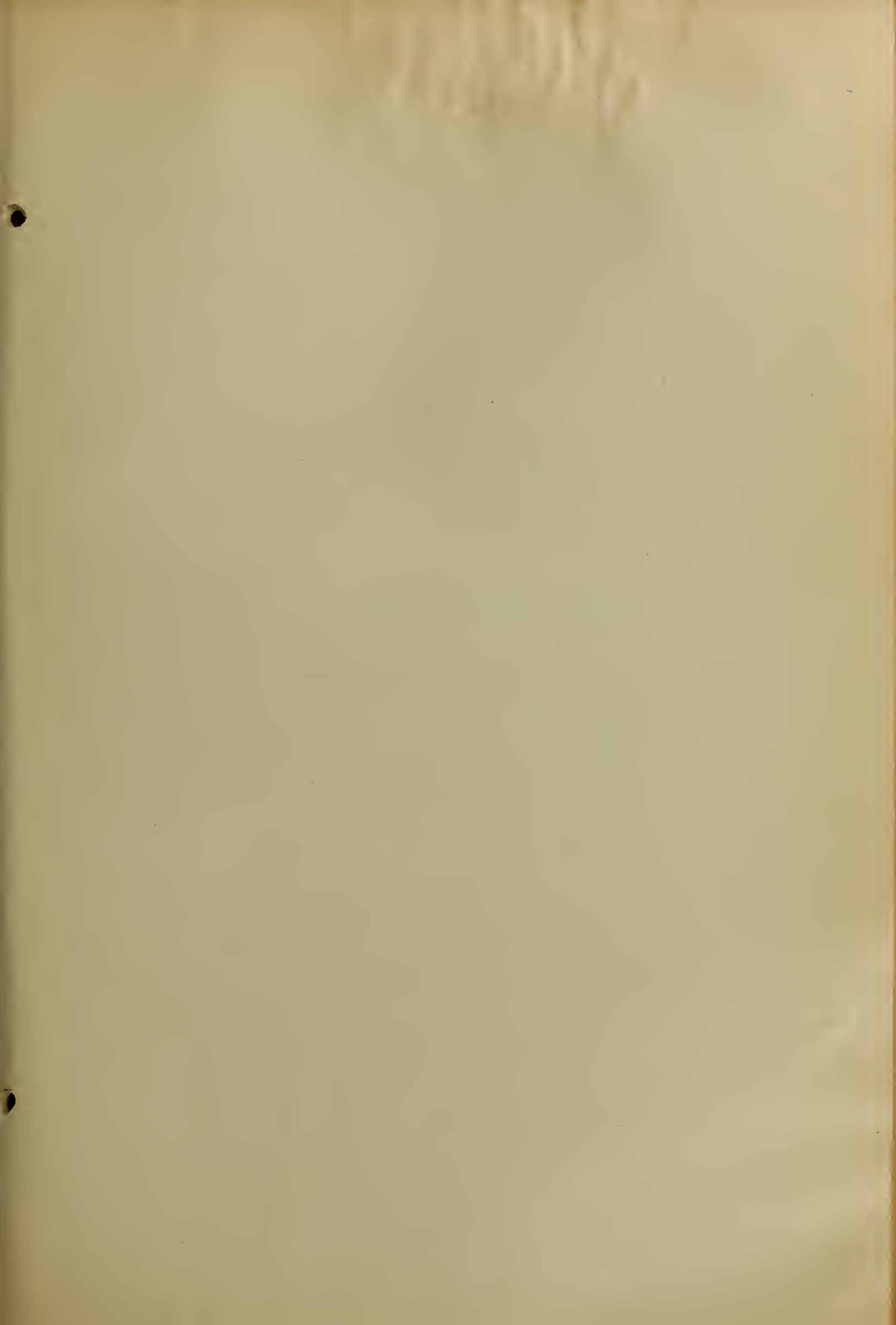
Witnesses

Stuart Hilder.

Frances W. Anderson.

By

E. W. Anderson for
 Attorneys



L. NORMAN.
 MEANS FOR AUTOMATICALLY STOPPING THE MOTORS OF TALKING MACHINES.
 APPLICATION FILED FEB. 5, 1915.

1,172,304.

Patented Feb. 22, 1916.
 2 SHEETS—SHEET 2.

Fig. 2.

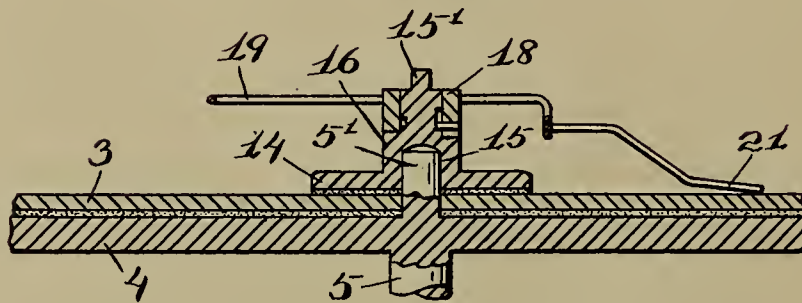


Fig. 3.

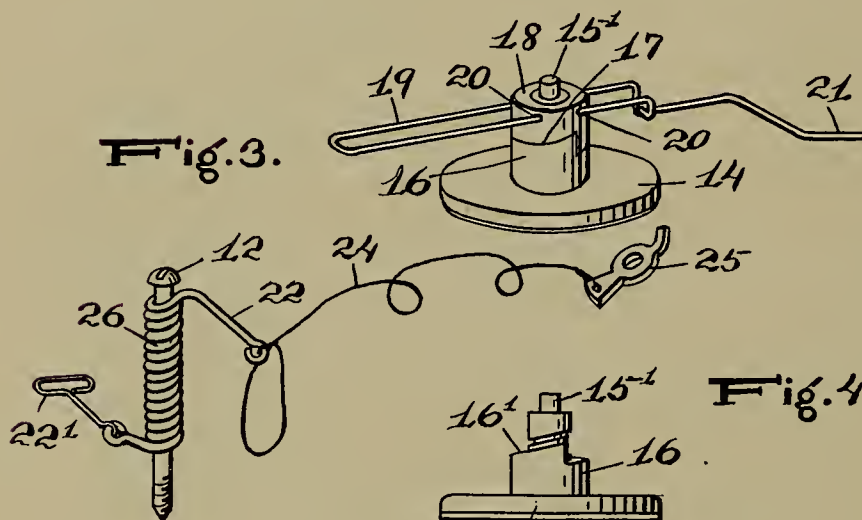


Fig. 4.

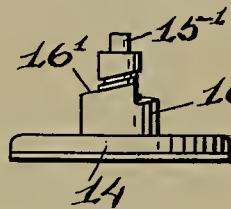


Fig. 5.



Witnesses

Stuart Filder.
 Frances W. Anderson.

Inventor

Ludwig Norman

By

E. W. Anderson & Son
 Attorneys

UNITED STATES PATENT OFFICE.

LUDWIG NORMAN, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF TO JACOB WOLKE, OF BROOKLYN, NEW YORK.

MEANS FOR AUTOMATICALLY STOPPING THE MOTORS OF TALKING-MACHINES.

1.172.304.

Specification of Letters Patent.

Patented Feb. 22, 1916.

Application filed February 5, 1915. Serial No. 6,292.

To all whom it may concern:

Be it known that I, LUDWIG NORMAN, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have made a certain new and useful invention in Means for Automatically Stopping the Motors of Talking-Machines; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a plan view of the invention, as applied with parts broken away, the slide being shown in dotted lines in the position of engagement with the needle. Fig. 2 is a section on the line 2—2, Fig. 1, with parts broken away. Fig. 3 is a perspective view of the invention, with parts detached from each other. Fig. 4 is a detail side view of the disk weight. Fig. 5 is a detail plan view of the same.

The invention has relation to means for automatically stopping the motor of a sound reproducing or talking machine at the end of the reproduction, or when the needle has reached the end of the groove in the record, avoiding the necessity for stopping the machine by hand, the object being to provide simple and efficient means, readily applicable to the common type of machine using a flat or disk record, without change in the machine or in the record.

The invention consists in the novel construction and combinations of parts, as hereinafter set forth.

In the accompanying drawings, illustrating the invention, the numeral 2 designates a talking machine, 3 the disk record thereof, 4 the turn table upon which the record rests, 5 the shaft of said table, 5' the top extension of said shaft engaged with the center hole of the record, 6 the spring brake normally bearing against the edge of the turn table to hold it stationary, 7 the usual pivoted lever having control of the spring brake to start and stop the machine, 8 the sound box and 9 the needle.

The lever 7 usually has movement upon the guideway 10, from stop 11 to stop 12 to start the machine, and back again to stop 11 to stop the machine. When the lever is

moved to half-way position between stops 11 and 12, if released it will fly back, under the influence of the spring of the brake, to stop position, and it is designed in the present case to engage and hold the lever at this halfway position during the playing of the record, and to automatically release the lever at the end of the playing.

The attachment to the machine is described as follows: 14 is a metal disk or weight, having a bottom seat 15 designed for removable engagement with the top extension 5' of the turntable shaft, the center post 16 of said disk being provided with an upper cam surface 16', engaged with the lower cam surface 17 of a loose rotatable ring 18 of said post, whereby when the cam ring is turned it will ride or move upwardly upon the post. The center post is provided with a top pin 15' extending above the cam ring. A slide 19 is carried by the ring 18, the branches of said slide having adjustable engagement with perforations 20 of the ring, and one end of the slide having downward extension at 21, adjacent to the top surface of the disk record.

A lever 22 is pivoted to the top of the casing of the machine, adjacent to the controlling lever thereof, usually by a screw-post 12, taking the place of the usual stop screw, one arm of said lever having removable connection by link 22' with the handle end of the controlling lever, and the other arm of said lever having connection by a cord or wire 24 with a ring 25. The lever 22 is provided with a fulcrum standard 26, from the respective top and bottom of which the arms of the lever have extension, in order that the cord or wire shall extend above the top of the disk record and the link 22 shall be located about on a level with the controlling lever. This fulcrum standard is preferably made in the form of a coiled spring with which the screw-post 12 has engagement as a pivot post.

In the application of the device the metal disk is engaged with the top extension of the turn table shaft, the screw-post is placed in position engaging the coiled spring standard of the lever 22, the link 22' is engaged with the controlling lever, the slide is adjusted so that its downward extension will be located properly with respect to the end spiral of the particular record being played, and the cord or wire is pulled until the con-

trolling lever has been moved about half way between stops 11 and 12, or until the brake upon the turn table has been released. the end ring of the cord or wire being then
 5 placed over the top pin of the post 16 as a cap to hold the controlling lever in released position. The turn table, carrying the record disk, now starts to turn, and will continue turning until the sound reproduction or playing is completed, the disk weight
 10 turning with the record, and the needle when reaching the end spiral of the groove in the record engaging the slide 19 (said slide normally turning with the disk weight) and
 15 stopping the slide and the cam ring, the weight proper continuing to turn with the record, the result being that the disk weight will turn about once around (the slide being held stationary), or until the cam ring has
 20 been raised sufficiently to release the end ring 25 against which it bears. The end ring is pushed upward by the cam ring until it escapes from the top pin 15' of the center post, when the controlling lever automati-
 25 cally flies back to stop position and the playing of the record is stopped.

The invention is designed to be used with any disk phonograph. Proper change is made in the brake according to the particular phonograph with which the device is
 30 used.

What I claim is:—

1. In a talking machine having a turntable provided with a center shaft, a swing-

ing element and a controlling lever, a weight 35 engaging said shaft and resting upon said table, a member upon said weight having cam means for raising the same upon turning of the weight in one direction, and means for causing it to turn with said weight in the 40 opposite direction, said member having means for engagement with said swinging element, said weight having a top extension, and a cap releasably engaging said top extension and having spring means of con- 45 nection with said lever.

2. In a talking machine having a turntable provided with a center shaft, a swinging element and a controlling lever, a weight engaging said shaft and resting upon said 50 table, said weight having a top extension and an upper cam surface the ends of which are connected by a shoulder, a member upon said weight having a lower cam surface the ends of which are connected by a shoulder, 55 a slide carried by said member and adapted for engagement with said swinging element, a cap releasably engaging said top extension, and a spring lever having at one end means of connection with the controlling 60 lever and at its opposite end connection with said cap.

In testimony whereof I affix my signature, in presence of two witnesses.

LUDWIG NORMAN.

Witnesses:

JOSEPH F. TRUNK, Jr.,
 F. HUSSENIUS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND CONTROLLER FOR PHONOGRAPHS,
#1,172,346-----R. E. FALDL,
Patented-February 22nd, 1916.
Filed-March 9th, 1915.

R. E. FALDL.
SOUND CONTROLLER FOR PHONOGRAPHS.
APPLICATION FILED MAR. 9, 1915.

1,172,346.

Patented Feb. 22, 1916.

Fig. 1.

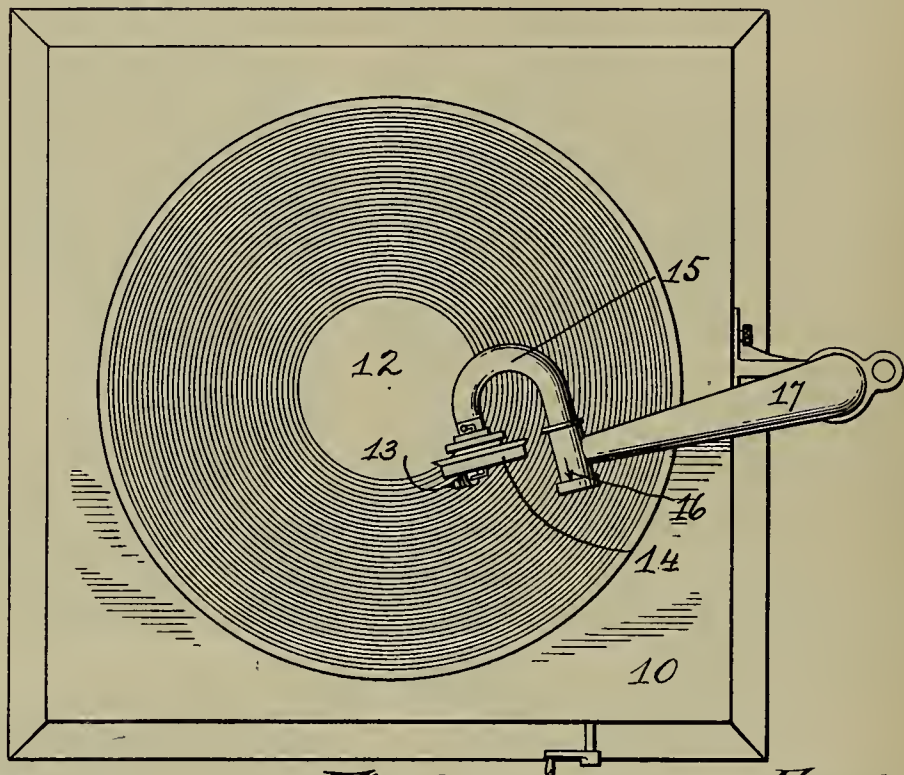


Fig. 3.

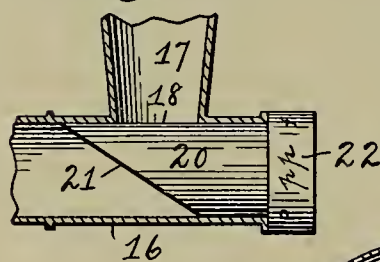


Fig. 2.

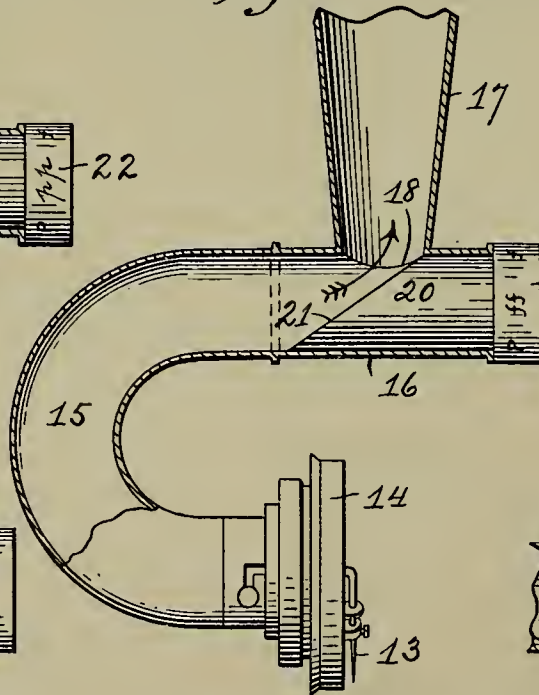


Fig. 6.

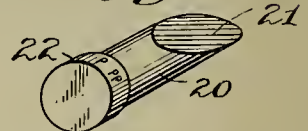


Fig. 7.

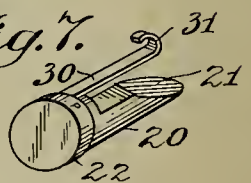


Fig. 4.

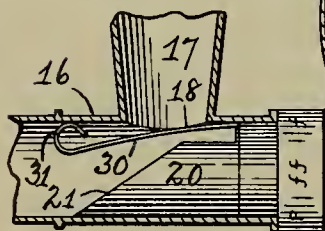
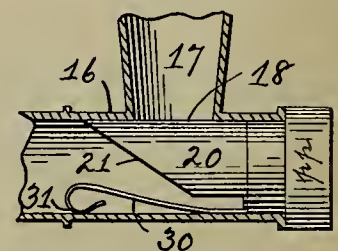


Fig. 5.



Attest:
Olga S. Miller
Mary H. Lewis

Rowland E. Faldl, Inventor:
by William R. Baird
his Att'y

UNITED STATES PATENT OFFICE.

ROWLAND E. FALDL, OF NEW YORK, N. Y.

SOUND-CONTROLLER FOR PHONOGRAPHS.

1,172,346.

Specification of Letters Patent.

Patented Feb. 22, 1916.

Application filed March 9, 1915. Serial No. 13,093.

To all whom it may concern:

Be it known that I, ROWLAND E. FALDL, a subject of the Emperor of Austria-Hungary, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Sound-Controllers for Phonographs, of which the following is a specification.

10 This invention relates to sound controllers for phonographs and similar sound reproducing devices, and more particularly to means for regulating the volume of sound issuing from such an instrument and reducing the number of metallic vibrations existing therein, and its novelty consists in the construction and adaptation of the parts, as will be more fully hereinafter pointed out.

20 Most phonographs and similar instruments are provided with a sound box taking the vibrations from the needle. This in turn, communicates with a sound box tube which is closed by any suitable means, and just before its termination a tube leading to the horn is inserted, forming an elbow with the sound box tube. The closure for the part of the tube beyond such elbow is usually a flat plate or disk threaded into the tube. The purpose of my invention is to provide this part of the sound box tube with a readily insertible controller which will extend far enough into the tube to govern the port leading to the horn to vary the extent of its opening. At the same time, I make the controller of such material that the metallic vibrations are to a great extent absorbed at that point and the sounds delivered through the horn are made softer and more harmonious.

In the drawings, there is illustrated a preferred form of my invention and its connection with a phonograph.

45 Figure 1 is a plan view of a phonograph provided with my controller; Fig. 2 is a transverse section through the end of the sound box tube and the adjacent part of the horn, showing my controller in place with the port leading to the horn practically open; Fig. 3 is a view similar to Fig. 2 but with the controller in such a place that the horn port is practically closed; Fig. 4 is a view similar to Fig. 2 but showing a modified form of controller; Fig. 5 is a view of the same parts, but showing the controller in a different position; and Figs.

6 and 7 are miniature perspective views of the two forms of the controllers.

In the drawings, 10 represents the usual box of a phonograph provided with a rotatable support for its record disks, one of which is indicated at 12. 13 is a needle, 14 is the sound box, 15 the sound box tube and 16 its usual terminal section to which is secured a tone arm 17 (or a tube leading to a horn). All of these parts are of usual construction.

One form of my improved controller is shown in perspective in Fig. 6. It consists of a cylindrical body 20, tapered or truncated at 21, at approximately an angle of 45° and a head 22 which is provided with an indicating notation whereby the effect of any particular position of the controller upon the quality of the sound may be ascertained by inspection. It is preferably made of cork, either natural or artificial or of some material possessing substantially the same qualities of softness, slight elasticity and the ability to absorb vibrations. Cork is the best material now known to me and I prefer to use it.

If the plate usually employed to close the end of the tube 15 is removed (as it usually may be by unscrewing it from such tube) and my controller is inserted as shown in Fig. 2, it will be noted that the port indicated at 18 leading to the horn 17 is wide open. If an index point as shown by the arrow (Fig. 1) is marked on the tube 16, the point on the head opposite such index when the port is thus wide open is appropriately marked "ff," the usual musical notation indicating an abbreviation of "fortissimo" or very loud. If, now, the controller be rotated to the position shown in Fig. 3, the port 18 leading to the horn is practically closed and only a very faint sound can be heard. The point on the head opposite the index under these conditions may be appropriately marked "pp," the usual musical notation indicating an abbreviation of "pianissimo" or very soft. Intermediate points on the head may be marked "f" to indicate "forte" or loud and "p" to indicate "piano" or soft. It is obvious that intermediate positions of the controller will give varying volumes of sound from the instrument. But in whatever position the controller be inserted in the tube 15, it will take up and absorb much, if not all, of the metallic squeak or vibration. My theory concern-

ing this effect is that it clings closely to the side of the tube at substantially all points and absorbs the shorter vibrations coinciding with the shriller or metallic sounds and does not allow them to pass into the horn tube. The resultant effect is quite marked whether my theory about it is correct or not.

In Figs. 4, 5 and 7, there is shown a modified form of the controller in which in order to insure and promote a close contact between the exterior of the controller and the interior of the tube there is provided a leaf spring indicated at 30 in the form of a flat piece of metal secured at one side of the controller and reverted at 31 to form a rounded terminal. This modified form of the device in no way alters the manner of its use, but the presence of the spring serves as stated to promote the contact between the controller and the tube.

I claim:

1. The combination with the sound box tube and horn tube of a phonograph, of a sound controller comprising a cylindrical plug rotatably fitted within the end of the sound box tube and which plug is made of sound

absorbing material and truncated at an angle at its inner end.

2. The combination with the sound box tube and horn tube of a phonograph, of a sound controller comprising a cylindrical plug rotatably fitted within the end of the sound box tube and which plug is made of sound absorbing material and truncated at an angle at its inner end and provided with a head upon which are displayed notations corresponding to different degrees of volume of sound.

3. The combination with the sound box tube and horn tube of a phonograph, of a sound controller comprising a cylindrical plug rotatably fitted within the end of the sound box tube and which plug is made of sound absorbing material and a leaf spring for promoting a close contact between the outside of the plug and the inner surface of the tube.

In testimony whereof I affix my signature in presence of two witnesses.

ROWLAND E. FALDL.

Witnesses:

MARY H. LEWIS,
ALDA L. MILLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

AUTOMATIC STOP MECHANISM FOR SOUND
REPRODUCING MACHINES,

1,172,370-----E. Kramm, Jr.,

Patented-February 22nd, 1916.

Filed-August 27th, 1914.

E. KRAMM, JR.
 AUTOMATIC STOP MECHANISM FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED AUG. 27, 1914.

1,172,370.

Patented Feb. 22, 1916.

2 SHEETS—SHEET 1.

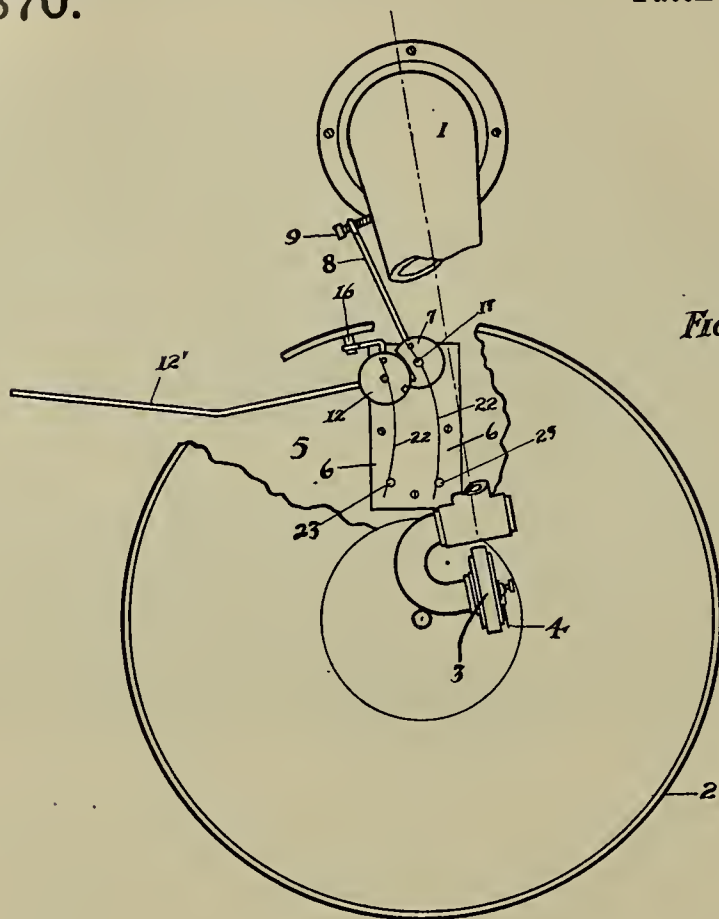
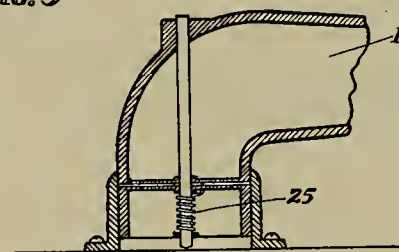


FIG. 1

FIG. 5



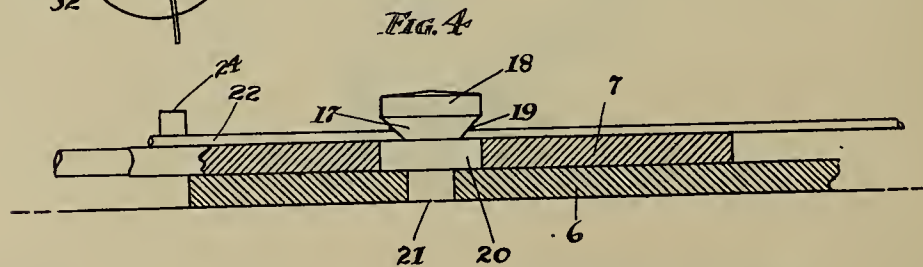
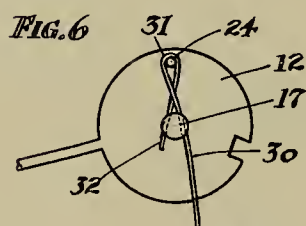
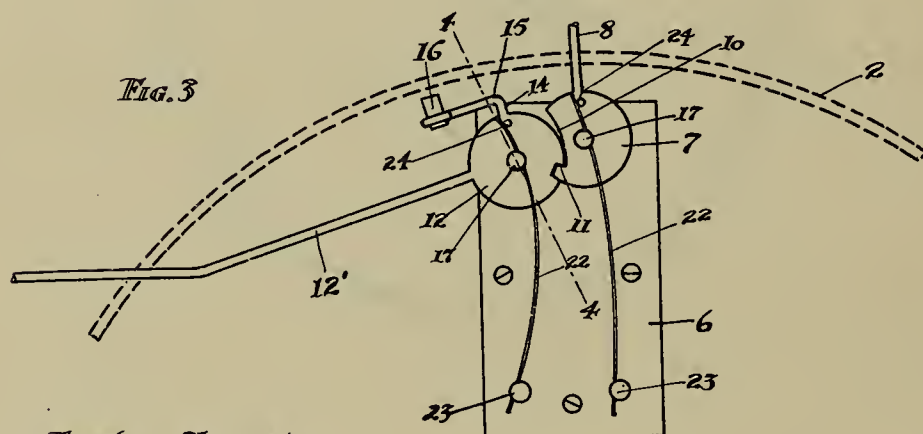
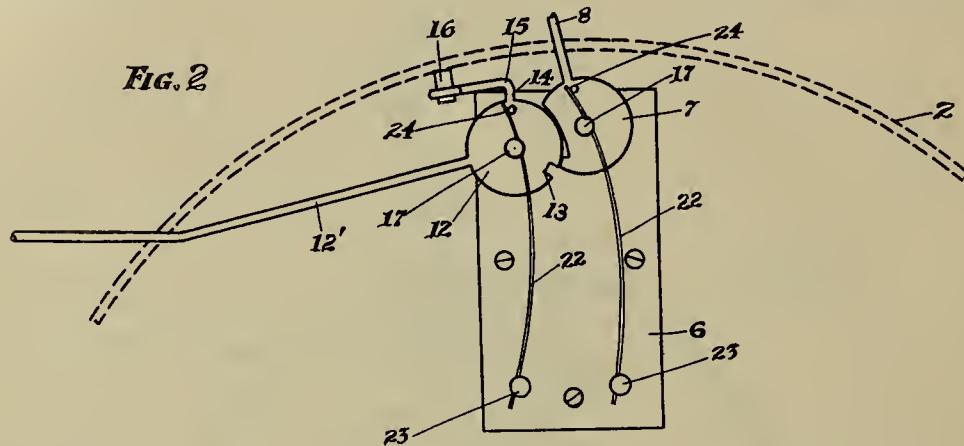
Witnesses:
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J. M. Copeland

Erhard Kramm Jr
 Inventor
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 Attorneys

E. KRAMM, JR.
 AUTOMATIC STOP MECHANISM FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED AUG. 27, 1914.

1,172,370.

Patented Feb. 22, 1916.
 2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

ERHARD KRAMM, JR., OF PEORIA, ILLINOIS.

AUTOMATIC STOP MECHANISM FOR SOUND-REPRODUCING MACHINES.

1,172,370.

Specification of Letters Patent.

Patented Feb. 22, 1916.

Application filed August 27, 1914. Serial No. 858,790.

To all whom it may concern:

Be it known that I, ERHARD KRAMM, JR., a citizen of the United States, a resident of Peoria, in the county of Peoria and State of Illinois, have invented new and useful Improvements in Automatic Stop Mechanism for Sound-Reproducing Machines, of which the following is a specification.

My invention relates to improvements in automatic stop mechanism for sound reproducing machines and is particularly adapted to the machines of the type using a disk or flat circular record.

The principal object of this invention is the provision of means for automatically stopping the rotation of the revoluble turntable and disk thereon upon the completion of the reproduction of the record, that is of the travel of the stylus-point in the record grooves.

A further object of my invention is the provision of a member adapted to engage and brake the rotatable table, said member being actuated at the completion of the reproduction of the record by the swingable portion of the tone-arm or horn, suitable operative connections being provided therebetween.

Another object of my invention is the provision of a member adapted to engage and brake the rotatable table, said member being normally held in non-engaging position while the record is being reproduced by means adapted to be released when the stylus-point of the reproducer has completed its travel through the record groove, the release of said braking member being accomplished through connections from said tone-arm or horn.

Another object of my invention is the provision of a device of the character described which may be made and sold in the form of an attachment to be applied to existing forms of sound reproducing machines without the necessity of reconstructing the same or making material changes.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, my invention consists in the construction, combination and arrangement of parts hereinafter described and then sought to be defined in the appended claims, reference being made to the accompanying drawings forming a part hereof and which show merely for the purpose of illustrative disclosure, a preferred embodiment of my in-

vention as applied to one of the standard forms of sound reproducing machines in use at present, it being understood however, that various changes may be made in practice within the scope of the claims without digressing from my inventive idea.

In the drawings, Figure 1 represents a plan view of a portion of a standard form of sound reproducing machine with a device constructed according to my invention applied thereto, parts being broken away to facilitate disclosure, the device being shown in the position assumed when braking, that is after the reproduction of the record is completed. Fig. 2 represents a plan view on a larger scale of the operating parts of my invention, shown in the position assumed when braking, as shown in Fig. 1. Fig. 3 is a view similar to Fig. 2, the parts, however, being shown in a non-engaging or non-braking position. Fig. 4 represents a detail sectional view taken substantially on line 4—4 of Fig. 3. Fig. 5 is a vertical sectional view through the swivel portion of the tone-arm or horn showing the spring for normally forcing the tone-arm or horn inwardly toward the center of the disk. Fig. 6 is a plan view of a modification of a detail of the manner of mounting and securing the spring.

In the operation of the sound reproducing machines it is frequently inconvenient to manually stop the machine at the completion of the reproduction of the record. If the machine is permitted to run, considerable disagreeable sound results from the scratching of the stylus-point on the ungrooved portion of the disk. This may also result in injury to the reproducer and to defacement of the disk. In view of these conditions a machine is left idle frequently, whereas were some automatic means provided for the stopping of the rotation of the table and disk upon the completion of the reproduction, the machine could be used considerably more without the liability of damage and the production of noise. It is, therefore, the purpose of my invention to provide a device, preferably in the form of an attachment, which is operated by the tone-arm or horn at the completion of the reproduction of the record to automatically brake the rotatable table to stop the rotation of the same and the record, this device being capable of being reset readily so that the machine can be easily started.

Referring now to the drawings and particularly to Fig. 1, the numeral 1 designates the swingable tone-arm or horn, which is swiveled so as to travel in the spiral sound groove of the record. 2 designates the table or disk support which is rotated by some suitable motor and is adapted to support and hold the record disk thereon. I also show reproducer 3 and the stylus-point 4. These parts are all well known forming part of a standard type of sound reproducing machine, the complete illustration of which is not made as it does not form part of my invention and is well understood in the art. Mounted on the casing 5 is the supporting plate or member 6 on which the various operating parts of the device are located and supported, as will be described. The disk 7 is mounted on said plate 6 so as to rotate or oscillate thereon and has the extension or arm 8 projecting outwardly therefrom and along the tone-arm or horn, as shown. This extension or arm 8 is adapted to be engaged by the tone-arm or horn 1 when the stylus on the reproducer reaches the terminus of the sound groove in the record, the set screw 9 being provided in the end thereof whereby any suitable adjustment may be made as necessary. This disk 7 has the cam-shaped cut-out portion 10 on one side with the lug or projection 11 at the inner end thereof. Located adjacent the disk 7 on the plate 6 is the braking and setting disk 12, this disk being also adapted to rotate or oscillate on said plate 6 and having the recess or socket 13 corresponding in size and shape to the lug or projection 11 on the disk 7. This lug or projection 11 and the recess or socket 13 cooperate to lock the braking disk in a non-braking or set position to permit the table to rotate. Projecting from said disk 12 is the brake arm or member 14 which is bent as at 15 to extend tangentially to said disk 12, as shown, the frictional braking member or plug 16 being mounted in the end thereof and adapted to engage a part of the table to stop its rotation. The setting arm or member 12' also extends outwardly from said disk 12 to a position for convenient manipulation by the operator.

As stated hereinbefore each of the disks 7 and 12 are mounted on the plate member 6 so as to rotate or oscillate. This mounting is shown in detail in Fig. 4. Each disk is pivoted on a pin or rivet 17 which has the head 18, a frusto-conical portion 19 inclining downwardly therefrom, an enlarged flange-like portion 20 on which the disk fits loosely, and a reduced extremital portion 21 for securing in the plate member 6. The inclined portion 19 of the rivet or pin 17 is for the purpose of forcing the spring member 22 downwardly on the disk and holding it there so as to prevent the displacement of the parts. This spring mem-

ber bears against the lug or rivet 23 at the other end of the plate member 6, against the pin or rivet 17 as above described, and against the lug or rivet 24 on the outer portion of the disk. This construction is the same for the two disks and they are therefore normally forced in a clock-wise direction, as is evident from a consideration of the drawings.

In Fig. 5 is shown the detail of the construction of the swivel part of the tone-arm or horn, the spring 25 being provided between the movable parts whereby the tone-arm or horn is normally forced inwardly toward the center of the disk.

In Fig. 6 is shown a modification of the manner of mounting and securing the spring for forcing the disk in a clockwise direction. This spring 30 is looped around the lug or rivet 24, as at 31, and the free end 32 passes on the other side of the pin or rivet 17. This holds the parts in position better against accidental displacement.

The operation of the device is as follows, it being assumed that the set screw 9 is properly adjusted and the record disk on the table: The parts are in the position shown in Fig. 2. The setting arm 12' is moved downwardly, that is referring to the drawing, it being understood that in practice this movement is horizontal. This rotates the disk 12 on its pin or rivet 17 counter clockwise causing the lug or projection 11 on the disk 7 to engage the recess or socket 13 in the disk 12, which therefore locks the braking arm 14 in a non-braking position, as shown in Fig. 3. When the stylus has completed its path of travel in the sound groove in the record, the spring 25 will force the tone-arm or horn rather suddenly toward the center of the disk, as there is no sound groove to interpose resistance to this movement, which through the engagement of the tone-arm or horn with the extension or arm 8 of the disk 7 results in a partial rotation of the disk 7 causing the lug or projection 11 to withdraw from the recess or socket 13, the spring member 22 on the disk 12 causing its partial rotation to assist said disengagement and to force the brake arm or member 14 against the periphery of the table. This brakes the table and prevents it from rotating so that the disk can be removed at any time that is convenient. It is to be noted that by having the brake arm constructed as shown, it jams against the periphery of the table and that any further rotation of the table increases the force of the engagement of the brake therewith due to the position of the pivot or fulcrum of the brake arm. It is of course understood, that the tone-arm or horn is moved so that the stylus-point is positioned at the beginning of the record groove before the setting arm or member 12' is ac-

tuated to cause the disks to assume the positions shown in Fig. 3 of the drawings, this movement being necessary first on account of the engagement of the member 8 with the tone-arm or horn when the machine is stopped.

I have described the plate member 6 as being mounted on the casing, but it is to be understood that this plate may be mounted at any place and the disks mounted in any manner just so that they cooperate properly to produce the action above set forth. Further, the detailed construction of the resilient means and the manner of mounting the same as well as that of the other parts is merely illustrative, being one of many forms that may be used as desired and according to various conditions. I have shown the brake as engaging the inside periphery of the table, but this engagement may be made in various other manners and places, as is obvious.

What I claim is:—

1. An automatic stop mechanism for sound reproducing machines, including a turn table, a swinging arm, a member mounted to oscillate and having an arm or extension adapted to be located in the path of movement of the swinging arm, so that said oscillatory member may be actuated thereby, and a second member mounted to oscillate and having a brake arm or member with means for normally tending to force the same into engagement with the turn table to stop the rotation of the same, said first mentioned oscillatory member having a cam shaped cutout portion with a lug or projection at one end thereof, said second mentioned oscillatory member adapted to fit in said cut-out portion and having a recess or socket with which said lug or projection is adapted to engage whereby the brake arm or member is normally held in non-braking position, the engagement of the swinging arm with the arm or extension of the first mentioned oscillatory member being adapted to release said second mentioned oscillatory member from its locked condition, so that the brake arm or member may be forced against the turn table.

2. An automatic stop mechanism for sound reproducing machines including a turn table, a swinging arm, a pair of members mounted to oscillate, one of said oscillatory members having an arm or extension adapted to be positioned in the path of movement of the swinging arm, the other of said oscillatory members having a brake arm or member adapted to engage the turn table, cooperating parts on said oscillatory members whereby the brake arm or member may be held in a non-braking position, the oscillating mounting of each member including a pin having a head and an enlarged flange like portion on which the member fits

loosely with a frusto-conical portion inclining downwardly located therebetween, a lug on each member and a spring for each member having one end held against movement and fitting against the frusto-conical portion of each pin with its other end engaging said lug on each member on the side opposite the side of the pin engaged, whereby the first mentioned oscillatory member is normally forced so that the arm or extension is moved toward the swinging arm and so that the second mentioned oscillatory member is normally moved toward a braking position.

3. An automatic stop mechanism for sound reproducing machines, including a turn table, a swinging arm, a support, a pair of disks rotatably mounted on said support, one of said disks having a braking arm or extension and the other of said disks having an arm or extension adapted to be positioned in the path of movement of the swinging arm, said disks having cooperating locking parts whereby the brake arm or extension may be held in non-braking position, said rotatable mounting of the disks including a member extending above the surface of the disks, lugs on said support and a lug on each disk, and resilient means one for each disk engaging said lugs and said rotatable mounting member, whereby the disks are normally held in a braking position.

4. An attachment for sound reproducing machines, including a support, a pair of disks mounted to oscillate thereon, each of said disks having an arm or extension, one of said arms or extensions being provided with braking means, the oscillating mounting of said disks including a member extending above the surface of the disks, lugs on said support and lugs on said disks on the side opposite said lugs on said support, and resilient means one for each disk engaging one of said lugs on said support, and one of said lugs on said disks, and also engaging said oscillatory mounting on the side opposite to which it engages said lugs, whereby the disks are normally held in a braking position, said disks having cooperating parts whereby they may be locked in a non-braking position.

5. An automatic stop mechanism for sound reproducing machines, including a turn table, a swinging arm, a member mounted to oscillate and having an arm or extension adapted to be located in the path of movement of the swinging arm, so that said oscillatory member may be actuated thereby, and a second member mounted to oscillate and having a brake arm or member with means for normally tending to force the same into engagement with the turn table to stop the rotation of the same, said first mentioned oscillatory member having a cam shaped cutout portion with a lug or

projection at one end thereof, said second
mentioned oscillatory member adapted to fit
in said cut-out portion and having a recess
or socket with which said lug or projection
5 is adapted to engage whereby the brake arm
or member is normally held in non-braking
position, the engagement of the swinging
arm with the arm or extension of the first
mentioned oscillatory member being adapted
10 to release said second mentioned oscillatory
member from its locked condition, so that
the brake arm or member may be forced
against the turn table, said second mentioned

oscillatory member having a setting arm ex-
tending outwardly therefrom and providing 15
means for oscillating said second mentioned
oscillatory member so as to bring the lug or
projection on the first mentioned oscillatory
member into engagement with the recess or
socket of the second mentioned oscillatory 20
member to hold the brake in a non-braking
position.

ERHARD KRAMM, JR.

Witnesses:

GEORGE T. BEAN,
J. M. ANDERSON.

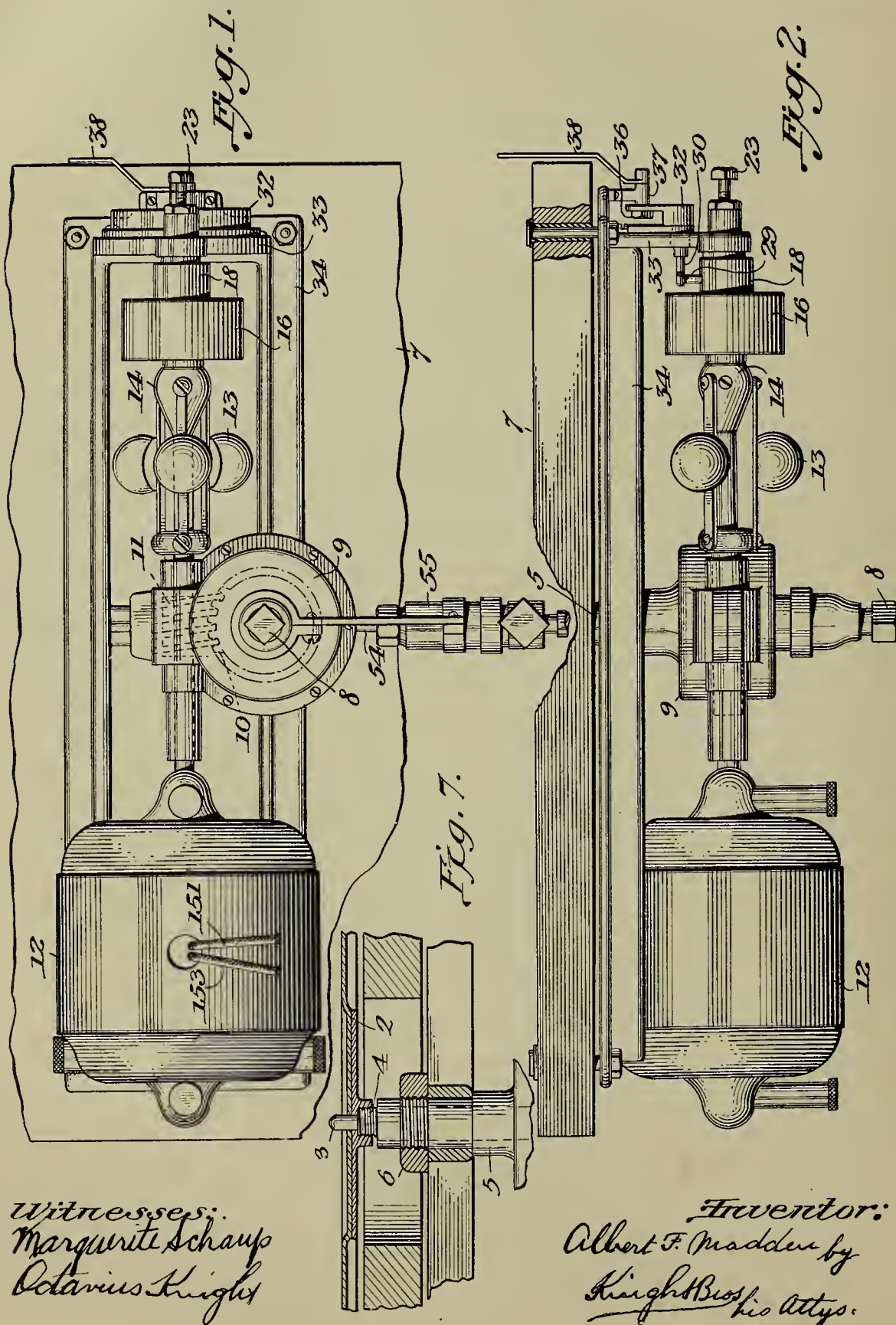
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

SPEED REGULATOR FOR
PHONOGRAPHS AND THE LIKE,
1,172,380-----A. F. Madden,
Patented-February 22nd, 1916.
Filed-October 31st, 1914.

A. F. MADDEN.
SPEED REGULATOR FOR PHONOGRAPHS AND THE LIKE.
APPLICATION FILED OCT. 31, 1914.

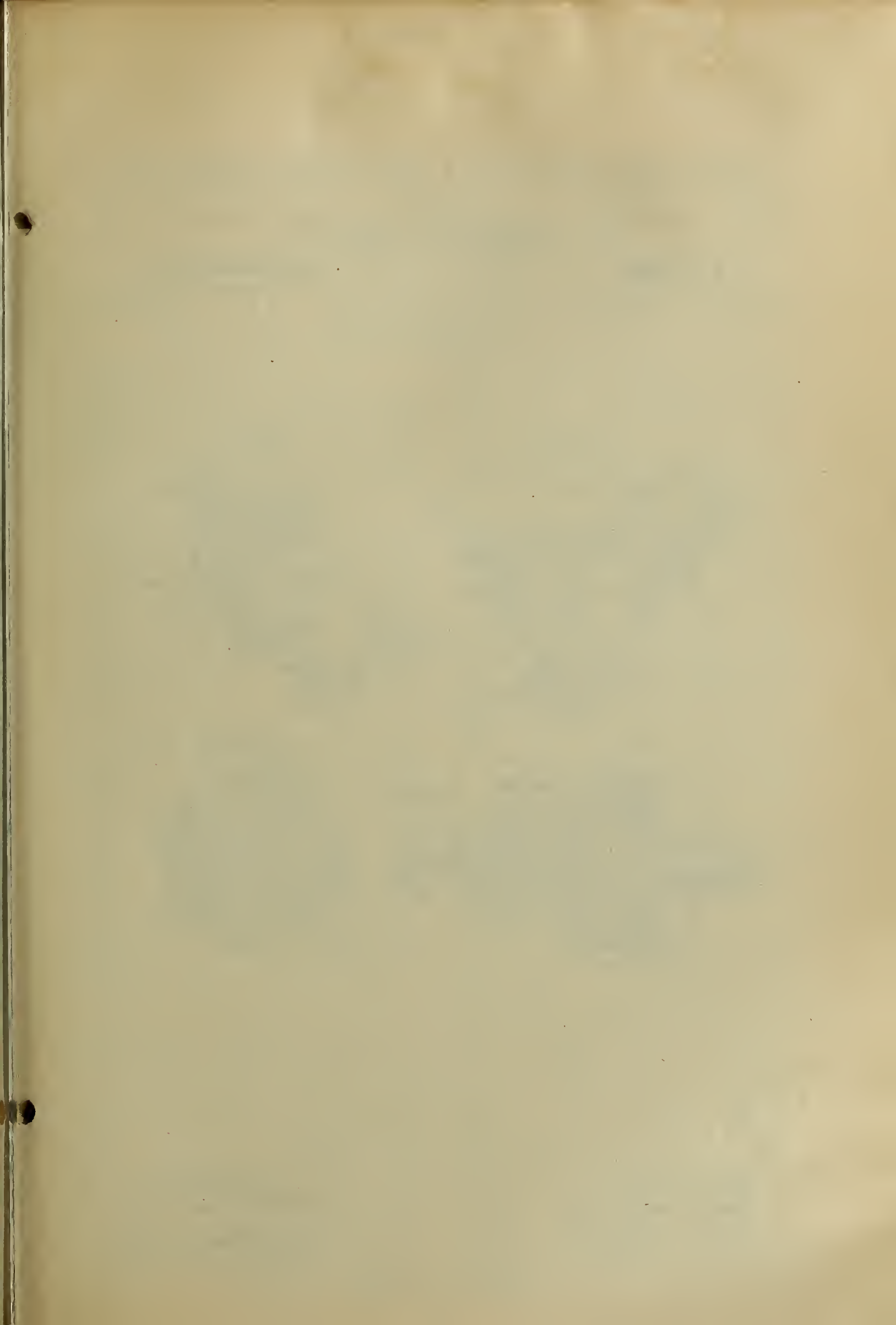
1,172,380.

Patented Feb. 22, 1916.
2 SHEETS—SHEET 1.



Witnesses:
Margurite Schauf
Octavius Knight

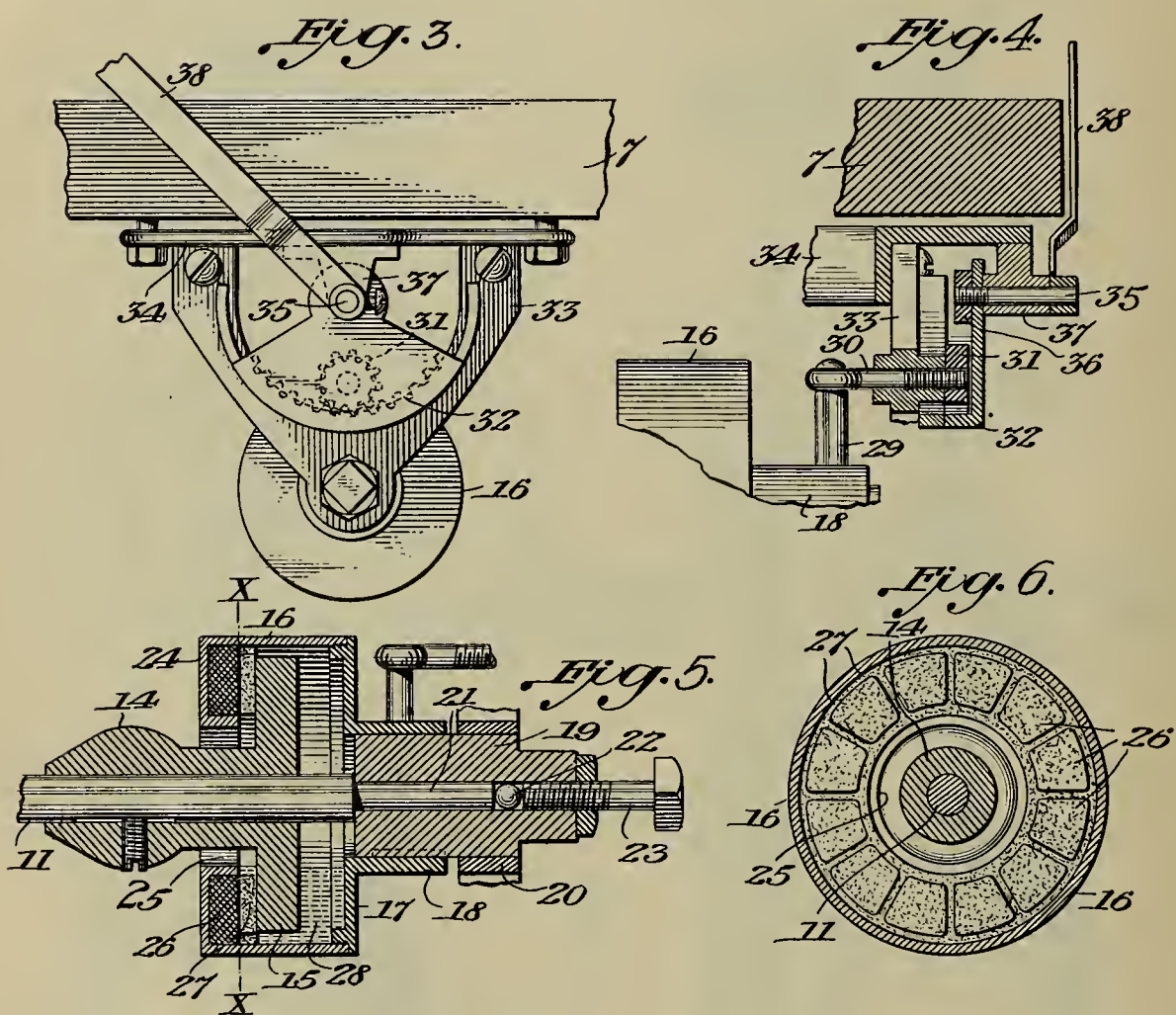
Inventor:
Albert F. Madden by
Knight Bros. his Attys.



A. F. MADDEN.
SPEED REGULATOR FOR PHONOGRAPHS AND THE LIKE.
APPLICATION FILED OCT. 31, 1914.

1,172,380.

Patented Feb. 22, 1916.
2 SHEETS—SHEET 2.



Witnesses:
Marguerite Schaub
Octavius Knight

Inventor:
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Knight Bros. his atty.

UNITED STATES PATENT OFFICE.

ALBERT F. MADDEN, OF NEWARK, NEW JERSEY, ASSIGNOR TO EDMUND H. LANSING,
OF BOSTON, MASSACHUSETTS.

SPEED-REGULATOR FOR PHONOGRAPHS AND THE LIKE.

1,172,380.

Specification of Letters Patent.

Patented Feb. 22, 1916.

Original application filed July 7, 1914, Serial No. 849,432. Divided and this application filed October 31, 1914. Serial No. 869,644.

To all whom it may concern:

Be it known that I, ALBERT F. MADDEN, a citizen of the United States, residing in the city of Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Speed-Regulators for Phonographs and the like, of which the following is a full and clear specification.

My invention relates in general to phonographs of the disk type and more especially to motor driven phonographs in which mechanism is provided for automatically stopping and repeating the reproduction.

The present application is a division of my prior application on motor driven phonographs, filed July 7th, 1914, Serial No. 849,432, which became Patent No. 1,127,056, dated February 2nd, 1915. The particular feature of the present case resides in a speed regulator.

In order to indefinitely repeat the reproduction on phonographs, it is desirable that some form of power drive be employed which is continuous in its operation; that is to say, to avoid the necessity of intermittent winding or storing of power in the drive mechanism as takes place in the usual spring motor driven phonographs. Power is also necessary to actuate the repeating mechanisms. The term "motor" as employed herein, is intended to indicate a power motor, preferably electric, to distinguish the driving means from the usual spring power drive mechanism in which the energy is stored by a manual operation in the act of winding.

It has heretofore been proposed to employ the electric motor for driving phonographs. Due to the variation in line voltage which is usually experienced in the operation of electric motors, considerable difficulty has been met in applying the electric motor drive to phonographs. The pitch of the tone reproduced by the phonograph, is of course under the direct influence of the speed at which the record is driven, and the slightest perceptible variation in the speed of the record interferes with the quality of the reproduction. It will therefore be apparent that the success of a repeating phonograph depends in a large measure upon the proper control of the driving mech-

anism employed and that the use of an electric motor can be practicable only when accompanied by a positive and reliable speed control for the motor.

According to my invention I employ preferably an electric motor in conjunction with a reliable governor of special design.

The invention will be more clearly understood from the description of a specific embodiment of the invention which I have illustrated by way of example in the accompanying drawings. It will be understood that the details of construction herein shown are only given to enable those skilled in this art to understand the principles of my invention and to make and use the same, as it will be apparent that the principles which form the basis of my present invention may be applied or utilized in many different constructions while still gaining the desired results.

Figure 1 is an underneath plan view of the electric motor and speed control devices; Fig. 2 is a front elevation of the same; Fig. 3 is a side elevation of the manually operated speed regulator; Fig. 4 is a front vertical section of the same; Fig. 5 is a similar view of the friction brake running in oil; Fig. 6 is a face view of the friction surface employed; Fig. 7 is a detail vertical section showing the main shaft or arbor and turntable of the phonograph.

Referring more specifically to said drawings, 1 indicates the cabinet of the machine, 2 the turn-table or record support, and 3 the main shaft or arbor by which the turntable and record are supported and driven. The turn-table 2 is threaded onto the arbor 3 at the point 4, and the arbor rotates in a bearing 5, which is secured by threaded collar 6 resting upon the support 7, which forms a part of the cabinet 1, (see Fig. 7). The arbor 3 rests upon a step bearing indicated at 8 in Figs. 1 and 2. Arbor 3 passes through a housing 9 within which a worm gear 10 secured on said arbor operates under the influence of a worm shaft 11, driven by electric motor 12. Shaft 11 has operatively coupled therewith a centrifugal device 13, the sliding member 14 of which terminates in a disk 15 within the friction brake housing 16, as illustrated in Fig. 5. The housing 16 has threaded into it a head portion

17, the tubular extension 18 of which is slidably mounted upon a bearing stud 19, which is fixed in the framework 20. Stud 19 is formed with an axial bore in which the reduced end 21 of the shaft 11 is journaled. A ball stop 22 is positioned in said bore by the set screw 23. The inner face 24 of the housing 16 has a tubular inward extension 25 projecting axially toward the disk 15 of the sliding member 14, and in the annular pocket thus provided, a friction body of leather or other absorbent material 26 is disposed having its exposed face provided with radial grooves 27.

15 The space within the housing 16 is supplied with a body of lubricating oil 28 in which the disk 15 runs. The disk 15 engages the friction material 26 and tends to retard the rotation of the shaft 11. During 20 the rotation of the disk 15, lubricating oil is continuously carried inward by absorption of the leather and outward by the disk so that the entire surface of the friction material 26 is thoroughly lubricated, this result being aided by the grooves 27 formed in the lubricating material 26, whereby the lubricating oil is better presented. The 25 high speed of the motor and disk necessitates a thorough and constant lubricating of the friction surface at all times as otherwise it would be impossible to accurately control the speed of the drive, due to irregular friction and generation of heat. It is this difficulty which has heretofore stood in 30 the way of the successful application of the motor drive to phonographs.

The friction exerted between the material 26 and the disk 15 may be manually regulated. For this purpose the housing 16 is 40 slidably mounted on the stud 19, as above referred to, and any suitable regulating mechanism may be employed for controlling the position of the housing 16. I have herein shown this regulating mechanism as comprising a pin 29 which engages in a perforation formed in sleeve 18, and which is 45 operated axially, of shaft 11 by a screw 30 slid in and out by pinion 31 and segment gear 32. Screw 30 is slidably mounted in bracket 33 which is secured to the framework 34. Segment gear 32 is fixed on shaft or stud 35 by a nut 36, and shaft 35 is freely journaled in the bearing 37 which depends from the framework 34. An operating handle 38 is fixed on the outer end of shaft 35 50 for rotating the same when the friction brake is to be adjusted manually.

It will be seen that during the operation of the motor 12, the sliding member 14 of 60 the governor 13 will assume a normal position on shaft 11, in which position a constant friction will be exerted between disk 15 and the friction material 26. Any tendency toward increased speed of motor 12 65 draws the disk 15 into firmer engagement

with the friction material 26 so that the retarding influence of the brake is increased and thus the increased speed of the motor is checked. Should the power of the motor 12 tend to diminish, the pressure exerted by 70 disk 15 against the friction material 26 is relieved so that the motor may continue to operate at the same speed. This normal speed is, of course, at all times under the control of the manual adjustment effected 75 through the operation of lever 38.

The mechanism thus far described constitutes the adjustable constant speed motor drive for the phonograph. The reliable speed control above described, makes it possible to employ the same motor for supplying compressed air to a pneumatic repeating system, without interfering with the pitch of the tone being reproduced. A pressure of from one to two pounds, which may amply suffice for the pneumatic devices, may 85 be generated in this way without perceptible variation in the speed of the motor. A pneumatic repeating system which I have employed for some time with entirely satisfactory results as shown and described in my original application of which this application is a division. Inasmuch as the repeating mechanism does not form any specific feature of the present invention the 90 same is not shown in the present application.

I claim:

1. A speed regulator for phonographs and the like comprising in combination a centrifugal device and a friction brake connected therewith, comprising an absorbent 100 brake body and a disk drawn together by said centrifugal device and immersed in oil.

2. A speed regulator for phonographs and the like comprising in combination a rotary 105 part to be driven, a centrifugal device operatively connected therewith, stationary and movable friction members engaging each other, one having an engaging face of absorbent material, said movable friction 110 member controlled and rotating with said centrifugal device, and a casing inclosing said friction members and adapted to contain a body of oil in which said friction members are immersed. 115

3. A speed regulator for phonographs and the like comprising a centrifugal device, and a variable friction brake operated thereby, said friction brake comprising rotary and stationary parts opposed to each 120 other and immersed in oil, one of said parts being formed of absorbent material and having its operating surface interrupted.

4. A speed regulator for motor driven phonographs and the like comprising in 125 combination a rotary part to be driven and a speed governor therefor, said speed governor having a variable friction brake and said variable friction brake comprising rotary and stationary parts opposed to each 130

other and immersed in oil, one of said parts being formed of absorbent material and having its operating surface grooved.

5 5. A speed regulator for phonographs and the like comprising in combination a rotary part and a variable friction brake operatively related thereto, said variable friction brake having rotary and stationary

parts opposed to each other and immersed in oil, the stationary part being formed of absorbent material and having its operating surface radially grooved.

ALBERT F. MADDEN.

Witnesses:

WM. A. COURTLAND,
OCTAVIUS KNIGHT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PITCH ASCERTAINING ATTACHMENT FOR SOUND
REPRODUCING RECORDS,
1,172,533-----T. L. Kane,
Patented-February 22nd, 1916.
Filed-March 13, 1915.

T. L. KANE.
PITCH ASCERTAINING ATTACHMENT FOR SOUND REPRODUCING RECORDS.
APPLICATION FILED MAR. 13, 1915.

1,172,533.

Patented Feb. 22, 1916.

Fig 1

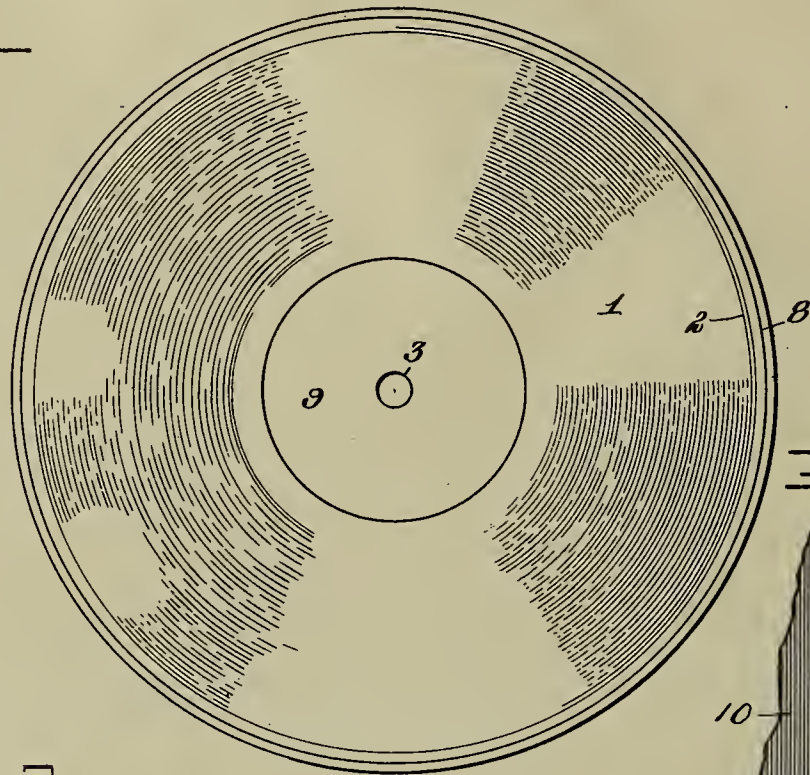


Fig 5

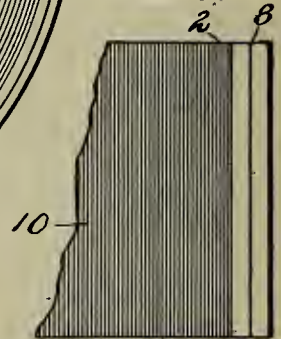


Fig 2

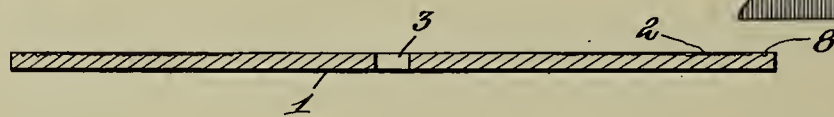


Fig 3

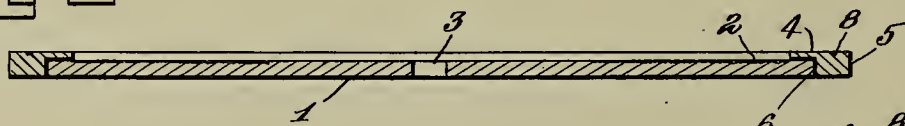
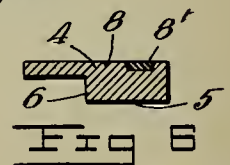
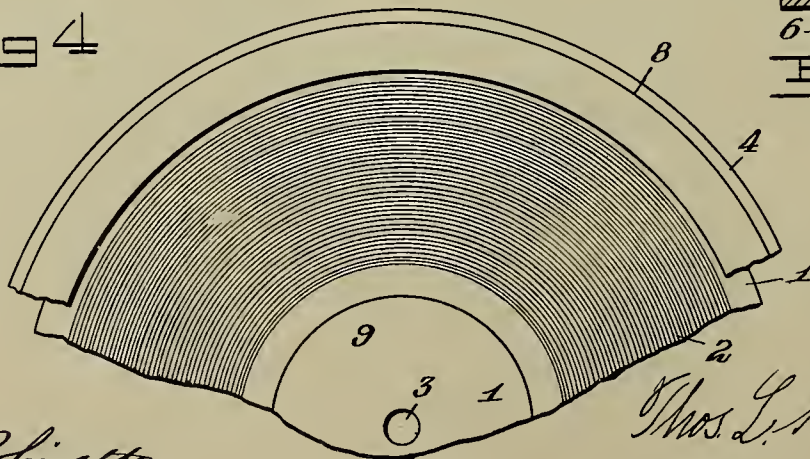


Fig 4



Inventor

Thos L. Kane

By

Adrian L. Kane
his Attorney

Witnesses

H. G. Robinson

Samuel B. Crandall

UNITED STATES PATENT OFFICE.

THOMAS L. KANE, OF KANE, PENNSYLVANIA.

PITCH-ASCERTAINING ATTACHMENT FOR SOUND-REPRODUCING RECORDS.

1,172,533.

Specification of Letters Patent.

Patented Feb. 22, 1916.

Application filed March 13, 1915. Serial No. 14,110.

To all whom it may concern:

Be it known that I, THOMAS L. KANE, a citizen of the United States, residing at Kane, in the county of McKean and State of Pennsylvania, has invented certain new and useful Improvements in Pitch-Ascertaining Attachments for Sound-Reproducing Records, of which the following is a specification.

The primary object of this invention is to facilitate the use of the phonograph, graphophone, and other similar music reproducing instruments, as an accompaniment in the teaching of music, and especially in the teaching of absolute pitch, by providing means for ascertaining the correct pitch at which any record element was produced.

A further object of this invention is to provide for applying my improvement, comprising the means of ascertaining the correct pitch, by a separate attachment, which may be made and sold as an independent article of manufacture, and applied to existing sound reproducing records now in common use, or my invention may be applied to the record during its manufacture.

Another object of this invention is to facilitate the application of my improvement, comprising the means of ascertaining the correct pitch, to any record now in use by the student of music, or by any operator of sound reproducing instruments.

With the foregoing and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts, and in the details of construction hereinafter described and claimed. It being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In order that my invention may be fully understood, attention is hereby directed to the accompanying drawings forming a part of this specification, and in which, Figure 1, is a plan view of a disk record with the pitch groove inscribed thereon. Fig. 2, is a centrally sectional elevation of the record showing the pitch groove inscribed thereon. Fig. 3, is a view similar to Fig. 2, showing a modification of my invention comprising a detachable ring having the pitch groove inscribed thereon. Fig. 4, is a fragmentary plan view of a portion of the record with

the modification, comprising the detachable ring applied thereto. Fig. 5, is a fragmentary side view of a portion of a cylinder record with the pitch groove inscribed thereon. Fig. 6, is an enlarged detail view of a section of the detachable ring with modification, comprising an annular recess on the top surface adapted to be filled with a softer composition such as wax from which cylinder records are made.

Referring to all figures of the drawings, the numeral 1, designates a disk sound record provided with the usual spiral sound groove 2, and the centering aperture 3.

As particularly shown in Fig. 3, a detachable ring 4, is provided, composed of any suitable material, but preferably of such material as is used in the manufacture of sound producing records. The outer portion 5 of the ring is of greater diameter than the disk and an annular channel is provided in the lower portion of the ring, one wall 6 of the channel positively engaging the edge of the disk. The ring 4, may be suitably attached to the record by an adhesive medium or otherwise, and thereby additionally reinforcing the disk against breakage.

In the application of my invention I provide for placing upon the free space near the outer edge of the record, between the outer edge or periphery and the point of the commencement of the spiral phonetic groove 2, or upon the annular face of the ring 4; an annular groove 8, having a substantial V-shaped indenture somewhat deeper than the spiral groove 2, to facilitate placing the stylus of the phonograph readily in position therein. Within this annular groove 8, is recorded either at the time of the manufacture of the record, or subsequently, a clear note in perfect pitch with the instrument, or with the voice from which the record is a reproduction, and for the purposes of readily ascertaining the pitch note by the operator, I provide for inscribing upon the record in addition to the title of the selection, in the usual place, as at 9, the key in which it is played, and at the point where the pitch note is inscribed the letter "A" or such other letter or name indicating the note used as a pitch note.

In Fig. 5, is shown the adaptation of my invention to a cylinder record wherein the pitch groove 8, is shown placed at the end of the cylinder before the beginning of the phonetic spiral groove 2. In the use of a

wax cylinder the student may create his own pitch groove 8, is shown placed at the end which the recordation in the phonetic groove was made.

5 In Fig. 6, is illustrated another modification of my invention wherein there is provided an annular recessed depression 8', in the face of the ring 4, adapted to be filled with a composition such as the wax from
10 which the common form of cylinder record is made.

In the use of this modification, the student can produce from some correctly tuned instrument as a piano, upon the wax surface
15 within the depression 8', a pitch note; or any good musician can with little trouble create his own pitch indentation after finding the true pitch in which the phonograph record was originally rendered.

20 By the use of my invention it will be readily appreciated by those skilled in the art, that a great deal of pleasure will be derived by being able to play their favorite instrument either accompanied by, or as an
25 accompaniment to, a good phonograph record, thus giving them the pleasure of playing as it were, with the world's best artists.

30 The great drawbacks heretofore experienced in using the graphophone record as an accompaniment with other musical instruments has been the difficulty of having the two instruments in perfect pitch with one another.

35 It is common knowledge that the alteration of the rotative speed at which a record is driven, will cause a corresponding alteration of the pitch, in which the selection on the record will be produced.

40 As practically all of the several record rotating machines now in common use, are provided with a speed control or governor the operator may adjust the speed at substantially the same rate of rotation as that
45 used at the time the record was made, and by these means the true pitch of the phonograph record can at once be obtained and sounded until the two instruments are in tune.

50 To illustrate the operation of the means embodying my invention: Middle "A" being the tone most commonly used by musicians in tuning their instruments, this (middle "A") should be sounded on a correctly
55 tuned musical instrument, or by a tuning fork, in perfect pitch with the instrument or voice rendering the selection producing the record, and by the adjustment on the phonograph, the rotative speed of the
60 record may be increased or decreased until the tones of the two instruments are in tune.

65 In the case of a piano or organ which are difficult for the student to tune, the phonograph reproduction can be tuned by means

of the adjustment of the governor which varies the rate of rotative speed of the record, thus lowering or raising the pitch to that of the piano or organ. On the other hand in the case of such instruments as the
70 violin, mandolin, cornet, or clarinet, these instruments being more easily tuned by the student, these can be tuned until their pitch is identical with that of the phonograph. Thus, in adapting the phonograph to the
75 piano, the stylus is placed in the pitch groove 8, of the rotating record, the middle "A" is struck by the student on the piano, and by the adjustment of the speed of the record rotator, it may be increased or de-
80 creased until the two tones are in tune. When this adjustment has been accomplished, the stylus is placed in the spiral at the beginning of the phonetic groove 2, on the record to commence the playing of the
85 selection thereon and the piano accompaniment may then be played, which if not known by memory, can readily be obtained, if the key in which it was rendered is written on the record. After the correct
90 regulation of speed of the disk rotator has been found, it can be written on the record for future use, thus obviating the necessity of retuning.

In the adaption of the violin, the stylus
95 is placed in the usual way, in the tone pitch indenture 8, and as it gives the note "A"—, the "A" string of the violin is tuned to the tone pitch and the rest of the violin to accord. The same general principles may be
100 applied in respect to other instruments.

By the use of the above described means embodying my invention, the amateur pianists can learn to accompany any song as though he or she were accompanying a
105 great vocal artist. The violinist can play obligatos to the greatest singers or be accompanied by the best of piano accompanists or orchestra, in fact the advantages to the student and the home lover of
110 good music are many and the changes innumerable.

Having thus described my invention, what I claim as new and desire to obtain
115 by Letters Patent is:

1. In a device of the class described, a record disk and independent means carried above the upper surface of the disk, at the edge thereof in a plane parallel with said surface for receiving a record of sound
120 vibrations, said means comprising a ring having channels on the opposite sides thereof, one of the channels being adapted to receive the record.

2. An attachment for a graphophone
125 disk comprising a ring formed of material adapted to receive a record, having a greater diameter than said disk and adapted to be carried upon the latter, the inner portion of the ring being cut away on its lower side
130

to form an annular channel for gripping the edge of the disk, the upper surface of the ring overlapping the upper surface of the disk and carrying means for actuating
5 a stylus for reproducing a given pitch and sustaining the latter.

3. An attachment for a graphophone disk comprising a ring formed of material adapted to receive a record, having a greater
10 diameter than said disk and adapted to be carried upon the latter, the inner portion of the ring being cut away on its lower side to form an annular channel for gripping the edge of the disk, the upper surface of the
15 ring overlapping the upper surface of the disk and carrying means for actuating a

stylus for reproducing a given pitch, said means including a countersunk ring of material of less density than that forming the first ring.

4. The combination with a disk record, of a supplementary record having frictional engagement with the edge of the first record, and having a plurality of independent record surfaces in a given plane above
20 the plane of said first mentioned record. 25

In testimony whereof I have affixed my signature in presence of two witnesses.

THOMAS L. KANE.

Witnesses:

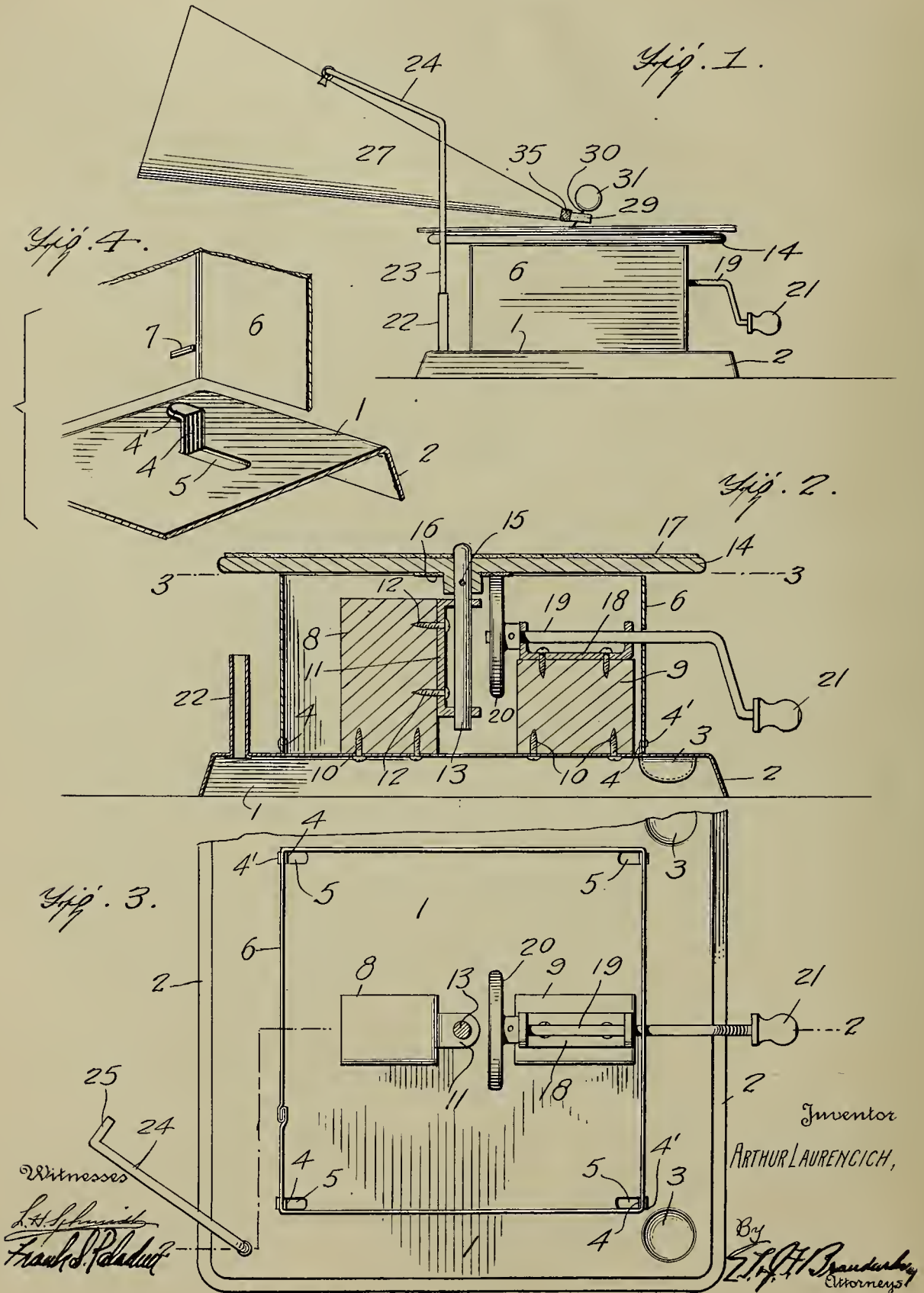
H. C. SWANSON,
C. C. DAVIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPHOPHONE,
#1,172,717-----A. Laurencich,
Patented-February 22nd, 1913.
Filed-April 22nd, 1915.

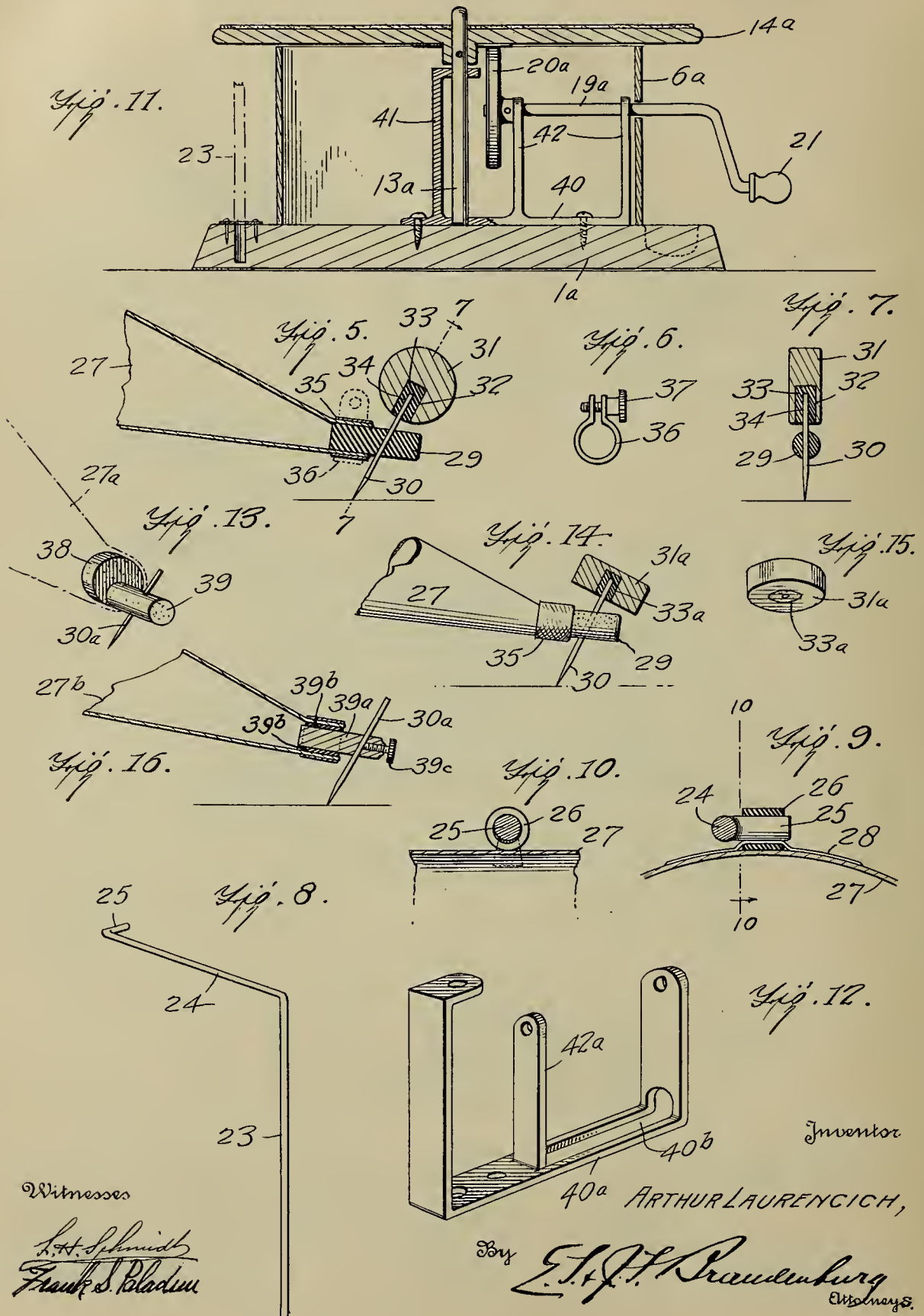
1,172,717.

Patented Feb. 22, 1916.
 2 SHEETS—SHEET 1.



1,172,717.

Patented Feb. 22, 1916.
 2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

ARTHUR LAURENCICH, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR OF
THREE-FOURTHS TO WILLIAM F. YATES, OF NEW YORK, N. Y.

GRAPHOPHONE.

1,172,717.

Specification of Letters Patent.

Patented Feb. 22, 1916.

Application filed April 22, 1915. Serial No. 23,170.

To all whom it may concern:

Be it known that I, ARTHUR LAURENCICH, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Graphophones, of which the following is a specification.

The primary object of my invention is to provide a graphophone which shall be peculiarly adapted for use by children as a toy.

To this end, the great desideratum, of course, is simplicity and consequent cheapness of construction, so that the graphophone-toy may not be of prohibitive cost, but may be manufactured at a low figure and sold at a nominal sum, at a substantial profit.

At the same time, the object is, with cheapness of construction, to provide a structure which shall present all reasonable durability.

Additionally, it is an object to provide a graphophone-toy, for use with disk records, which will, in operation, be musical to the ear of the auditor, and in which the tone shall be clear and distinct.

A further object is to provide a graphophone in which all noise, such as rattling or clicking of machinery, shall be eliminated, thereby insuring a more satisfactory playing of the records.

A further object is to eliminate the use of the spring motor, which characterizes the customary graphophone now on the market. A spring motor is always getting out of order, after a period of use thereof, and needs cleaning, etc., to maintain the same in proper condition, and, besides, the spring motor makes more or less noise in operation. It is, therefore, the object of my invention to substitute means whereby the disk-supporting table may be manually revolved, with a minimum of effort and a maximum of ease.

Other objects relate to details and refinements of construction, going to make up the ultimate perfection of the entire device; for example, to improved and novel means for holding the reproducer-needle, etc., all as will be described hereinafter.

With these objects in view, the invention resides in the novel construction, combination and arrangement of parts of a toy-graphophone, such as hereinafter fully described

in the specification, summed up in the claims, and illustrated in the drawings.

In the accompanying drawings, I have shown different illustratory ways of carrying out the underlying principles of the invention; it being understood that like reference-characters denote corresponding parts throughout the several views.

The different views of the drawings may be briefly described as follows:

Figure 1 is a side elevation of the preferred form of my invention; Fig. 2 is a vertical sectional view on the line 2—2, Fig. 3. Fig. 3 is a top plan view, on the line 3—3, Fig. 2, looking downward; Fig. 4 is a fragmentary sectional detail view of the base and the casing, showing the manner of their assemblage; Fig. 5 is a fragmentary sectional detail view of the horn, reproducer-needle, etc.; Fig. 6 is a detail view of a clamp that may be used around the reduced end of the horn; Fig. 7 is a sectional view on the line 7—7, Fig. 5; Fig. 8 is a detail perspective view of the rod from which the horn is suspended; Fig. 9 is a fragmentary sectional detail view of the horn and its support; Fig. 10 is a section on the line 10—10, Fig. 9; Fig. 11 is a vertical sectional view of a slightly modified form of graphophone; Fig. 12 is a perspective detail view of a slightly modified form of bracket, which may be substituted for that shown in Fig. 11; Fig. 13 is a fragmentary detail view showing a slightly modified form of support for the reproducer-needle; Fig. 14 is a fragmentary detail view of a horn and a slightly modified form of weight for the reproducer-needle; Fig. 15 is a detail view of the weight shown in Fig. 14; Fig. 16 is a fragmentary sectional detail view of a slightly modified form of support for the reproducer-needle.

My invention relates to that class of talking-machines in which the reproduction of sound is effected without a diaphragm, by the vibration of a trumpet or horn by a stylus operating upon the record which carries the sound-writing.

Referring, now, in detail to the drawings, and, first, to Figs. 1 to 10 thereof: 1 designates a base, which, for purpose of simplicity and convenience to manufacture, is of sheet metal, as shown, stamped and pressed up into the desired form. The base comprises, preferably, a flat plate provided with a marginal, depending flange 2 en-

tirely surrounding the plate. In this base 1, desirably formed integral therewith, is a pocket 3, there being, if desired, more than one of such pockets, for the reception, respectively, of unused and used reproducer-needles. The sheet-metal base 1 is also desirably provided with preferably integral lugs 4, for a purpose presently appearing, and which are desirably formed by slitting or cutting the material of the base and bending up the material along the lines of the cut, openings 5 being thus left in the base.

6 designates a preferably sheet-metal casing, which may be of any desired form, and is seated upon the base 1 and secured thereto, preferably in the manner and by the means now to be described. The shell or casing 6 is provided with openings 7. When the shell 6 is placed on the base, in assembling the parts, the bent terminals 4' (see Fig. 4) of the lugs 4 are sprung through the openings 7, and said terminals then bent down (as shown in Fig. 2), so as to bear against the outer surface of the shell or casing 6 (as shown in Fig. 2), thereby securing said shell in position on the sheet-metal base 1, against accidental displacement or removal therefrom.

Carried by the base 1, interiorly of the casing 6, are two, spaced, preferably wooden blocks, 8, 9, which may be conveniently secured to the base by screws 10. Carried by the block 8, preferably on one side thereof, is a preferably metallic bracket 11, conveniently secured to said block by screws 12. The bracket is apertured, as shown, and said apertures constitute bearings for the revolvable spindle 13 axially carried by the rotatable table 14, and pinned thereto, as shown at 15. The table 14 preferably carries, on its under surface, axially thereof, a preferably paper disk-washer 16, which may be pasted to the table 14. The table also preferably carries, on its top, the usual felt cover 17. The block 9 carries, preferably on the top thereof, a bracket 18 apertured to constitute bearings for the crank-shaft 19 carrying, at one extremity thereof, a friction wheel 20, bearing against the washer 16 of the table 14. The crank-shaft conveniently carries, at the other extremity thereof, a handle 21, for ready manipulation of said shaft.

Carried by the base 1, exteriorly of the casing 6, is a vertical tube 22. Revolvably supported by said tube is a rod 23, having an angularly-bent portion 24, having, at its free end, a right-angularly bent hook 25, which, in practice, engages an eve or ring 26, preferably of rubber, carried by a horn 27, preferably through the medium of a strip of suitable material 28, preferably fabric, suitably secured, as by paste, or stitching, or rivets, or the like, to the horn, which latter, from the stand-point of cheapness to

manufacture, is preferably made of paper, suitably treated, as by varnish, or the like, to make it stiff and reasonably durable. It is to be understood, however, that the horn may be formed of any other sonorous material. The horn carries, projecting therefrom at its reduced extremity, a plug 29, preferably of rubber, provided with a vertically inclined opening therethrough, through which a reproducer-needle 30 may be passed and held therein by friction.

The stylus or reproducer needle 30 carries, at its upper end, a removable weight 31, which I have found, by experiment, to be very desirable and, in fact, essential to the proper operation of the graphophone. Said weight 31 is, desirably, a metallic disk, and, as shown in Fig. 5, it is provided with a recess 32 in which is seated an inset 33, of elastic material, such as rubber. This inset 33 has a longitudinally-extending recess 34 therein, whereby the weight may be seated on and carried by the top of the needle.

Encircling the reduced end of the horn is a reinforcing-thimble 35, of suitable material, preferably fabric, which may be pasted to said reduced end of the horn.

As shown in Fig. 6, a friction clamp 36 may encircle the reduced end of the horn and the fabric thimble 35 carried thereby, said clamp being tightened by means of a screw 37.

As shown in Fig. 13, the horn 27^a may carry, in its reduced end, a rubber disk 38 eccentrically carrying an integral cylindrical projection 39, through which the reproducer-needle 30^a passes, and is frictionally held therein.

Fig. 14 merely shows a metallic disk-weight 31^a provided with a rubber inset 33^a disposed in one face thereof, instead of in the perimeter of the disk, as shown in Figs. 5 and 7.

In Fig. 16, 39^a designates a metallic or wooden plug seated in the reduced end of the horn 27^b. 39^b is a rubber gasket or thimble encircling the plug 39^a. The reproducer-needle 30^a projects through an inclined aperture in said plug, and is clamped therein by means of a set-screw 39^c.

Referring, now, to Figs. 11 and 12: Here, the base 1^a is a wooden, instead of a metallic, plate; and carries a cylindrical casing 6^a. Interiorly of the casing, the base carries a preferably metallic bracket 40, comprising the base portion, as shown, from which rise standards 41, 42, 42, the standard 41 forming bearings for the rotatable spindle 13^a of the rotating table 14^a, and the standards 42, 42 forming bearings for the crank-shaft 19^a carrying at its inner end the friction disk 20^a.

Fig. 12 merely shows a different form of bracket 40^a, which may be substituted for the bracket 40, of Fig. 11. In the bracket 40^a, one of the standards 42^a is formed by

slitting the metal of the bracket and bending it up, as shown, leaving a slot 40^b.

While, for the purpose of complying with the provisions of the patent statutes, I have with great particularity described certain instrumentalities for carrying into effect the underlying principles of the invention, it is to be understood that all modifications of structure as come within the scope of the appended claims constitute no departure from the spirit of the invention, and fall strictly within the scope and purview thereof.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a graphophone, the combination, with a horn having a reduced end, of a plug carried by and projecting from said reduced end, a reproducer-needle carried by said plug, and a weight removably carried by the upper end of said needle.

2. In a graphophone, the combination, with a horn having a reduced end, of a plug carried by and projecting from said reduced end, a reproducer-needle carried by said plug, and a weight frictionally carried by the upper end of said needle.

3. In a graphophone, the combination, with a horn having a reduced end, of a rubber plug carried by and projecting from said reduced end, a reproducer-needle carried by said plug, and a weight removably carried by the upper end of said needle.

4. In a graphophone, the combination, with a horn having a reduced end, of a plug frictionally carried by and projecting from

said reduced end, a reproducer-needle carried by said plug, and a weight removably carried by the upper end of said needle.

5. In a graphophone, the combination, with a horn having a reduced end, of a plug carried by and projecting from said reduced end, a reproducer-needle carried by said plug, and a weight having an insert provided with a recess into which said needle projects.

6. In a graphophone, the combination, with a horn having a reduced end, of a plug carried by and projecting from said reduced end, a reproducer-needle frictionally carried by said plug, and a weight removably carried by the upper end of said needle.

7. In a graphophone, the combination, with a horn having a reduced end, of a plug carried by and projecting from said reduced end, a reproducer-needle carried by said plug, and a weight having an insert, of yielding material provided with a recess into which said needle projects.

8. In a graphophone, the combination, with a horn having a reduced end, of a plug carried by and projecting from said reduced end, a reproducer-needle carried by said plug, and a weight having a rubber insert provided with a recess into which said needle projects.

In testimony whereof, I affix my signature in presence of two witnesses.

ARTHUR LAURENCICH.

Witnesses:

LILLIAN I. ALLISON,
E. T. BRANDENBURG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

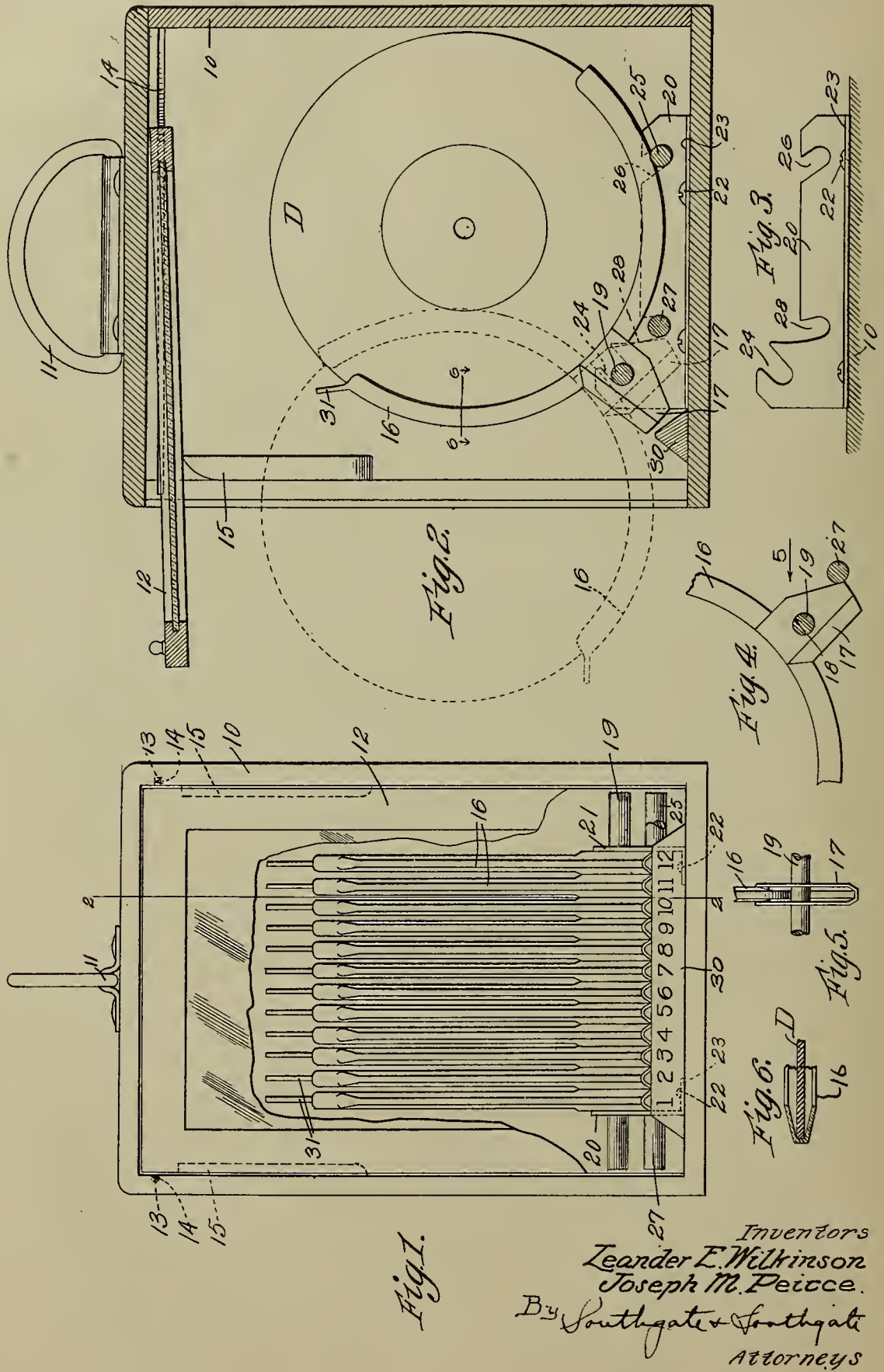
PHONOGRAPH PATENT.

PHONOGRAPH DISK HOLDER,
1,172,754-----L.E.WILKINSON & J.M.PEIRCE,
Patented-February 22nd, 1916.
Filed--August 3rd, 1915.

L. E. WILKINSON & J. M. PEIRCE.
 PHONOGRAPH DISK HOLDER.
 APPLICATION FILED AUG. 3, 1915.

1,172,754.

Patented Feb. 22, 1916.



Inventors
 Leander E. Wilkinson
 Joseph M. Peirce.
 By Southgate & Southgate
 Attorneys

UNITED STATES PATENT OFFICE.

LEANDER E. WILKINSON AND JOSEPH M. PEIRCE, OF FITCHBURG, MASSACHUSETTS.

PHONOGRAPH-DISK HOLDER.

1,172,754.

Specification of Letters Patent.

Patented Feb. 22, 1916.

Application filed August 3, 1915. Serial No. 43,453.

To all whom it may concern:

Be it known that we, LEANDER E. WILKINSON and JOSEPH M. PEIRCE, citizens of the United States, residing at Fitchburg, in the county of Worcester and State of Massachusetts, have invented a new and useful Phonograph Disk-Holder, of which the following is a specification.

This invention relates to a phonograph disk-holder and more particularly to the type of holder shown and described in the patent to Mitchell, No. 895,655, issued August 11, 1908.

It is the general object of our invention to improve the construction of the disk-holder shown in the Mitchell patent with increased economy of manufacture and efficiency in operation.

With this general object in view, one feature of our invention relates to improvements in the supporting structure by which we simplify the assembling of the disk-holding levers within the inclosing casing. With this improved construction no longitudinal movement of any of the parts within the casing is necessary when inserting or removing the parts therefrom.

Further features of our invention relate to improvements in the construction of the levers themselves and to certain arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of our invention is shown in the drawings, in which—

Figure 1 is a front elevation of the casing, a portion thereof being broken away to show the parts inclosed thereby; Fig. 2 is a sectional side elevation taken along the line 2—2 in Fig. 1 but showing the door in raised position; Fig. 3 is a right-hand side elevation of one of the supporting brackets; Fig. 4 is a detail side elevation of a portion of one of the disk-holding levers; Fig. 5 is an end elevation of a portion of one of the levers looking in the direction of the arrow 5 in Fig. 4; and Fig. 6 is a detail sectional plan view taken along the line 6—6 in Fig. 2.

Referring to the drawings, we have shown our phonograph disk-holder as mounted within a casing 10 provided with a handle 11 and having a door 12 provided with projecting pins 13—13 slidable in grooves 14—14 formed in the side walls of the casing 10 near the upper ends thereof. Stops 15—15

are secured to the side walls and serve to retain the open door in raised position.

The phonograph disks D are each supported in pivoted curved levers 16 grooved in their upper faces to receive the disks and substantially conforming in curvature to the contour of the disk. In the preferred form, each lever is formed of a single piece of sheet metal pressed into the requisite curved outline and provided with a deep groove upon its inner or upper surface.

Near the central portion of each lever, a projection or lug 17 is secured to the lever and is provided with a transversely-extending opening 18. As shown in the drawings, the projection 17 is also formed of sheet metal and is pressed into a U-shaped section, being soldered or otherwise secured at its upper end to the lever 16.

The levers 16 are pivotally supported upon a rod 19 extending through the several openings 18 in the projections 17 and acting as a pivotal support for the entire series of levers. The rod 19 is supported at or near each end in brackets 20 and 21 formed of sheet material and secured to the casing 10 by screws 22 extending through flanges 23 provided at the lower ends of the brackets.

While we have shown the brackets as separately formed, it will be understood that the two brackets 20 and 21 may be formed from a single piece of material if so desired. Each bracket is provided with an upwardly and rearwardly inclined open slot 24 within which the rod 19 may be received. With this construction, the brackets 20 and 21 may be secured within the casing and the levers 16 may be assembled upon the rod 19, the rod 19 being thereafter inserted in the slots 24 without the necessity of providing openings in the sides of the casing, such as are shown in the Mitchell patent. This method of assembling the parts possesses important advantages, as it permits the disk-holders to be used in any casing of suitable size without in any way disfiguring the outer surface of the casing.

In order to position the levers within the casing, we provide a stop rod 25 supported in open slots 26 in the brackets 20 and 21, and for holding the levers in open or forward position we provide a second stop rod 27 which is mounted in slots 28 in the brackets 20 and 21, said rod 27 engaging a downwardly-extending portion of each lug or

projection 17 when its respective lever is moved outwardly, as clearly shown in Fig. 4.

The slots 24, 26 and 28 are so disposed angularly that the side walls of the slots will prevent displacement of the rods by the pressure of the disk-holding levers when in either open or closed position, while at the same time they permit ready insertion of the rods after the brackets have been placed within the casing.

In order to identify the different records, a numbered plate 30 is secured to the bottom of the casing 10 in such a position that the ends of the projections 17 are closely adjacent to the numbers upon the plate 30 when the disk-holding levers are in their rear position, the projections 17 then acting as indicators for distinguishing the different records.

Having fully described the construction of our improved phonograph disk-holder, the operation thereof will be evident from inspection of the drawings. Any desired record may be withdrawn from the casing by grasping the projecting handle 31 provided at the upper end of each lever 16 and thereby swinging the selected lever outwardly to the open position shown in dotted lines in Fig. 2, in which position the disk may be readily removed. The lever will be retained in open position by the engagement of its projection 17 with the stop rod 27 while the remaining levers are held in uniform closed position by engagement with the stop rod 25.

Having thus described our invention, it will be evident that changes and modifications can be made therein by those skilled in the art without departing from the spirit and scope thereof as set forth in the claims, and we do not wish to be otherwise limited to the details herein disclosed, but

What we claim is:—

1. A phonograph disk-holder having, in combination, a plurality of grooved disk-holding levers, a rod upon which said levers are pivoted, a pair of stop rods effective to position said levers in either open or closed position, and supports for said rods each

having a plurality of open slots adapted to receive said rods and so disposed that said rods cannot be displaced therefrom by the action of the levers in any position.

2. A phonograph disk-holder having, in combination, a plurality of disk-holding levers each having a projecting lug near its central portion, a rod upon which said lugs are pivoted, a second rod engaging said lugs and acting as a stop for said levers when in open position, a casing within which said rods are supported, and a numbered plate secured in said casing to designate said levers, said lugs being positioned closely adjacent said plate when the levers are in closed position and acting as indicators therefor.

3. A phonograph disk-holder having, in combination, a casing, a plurality of disk-holding levers, and means for pivotally mounting said levers in said casing, said means comprising brackets secured in said casing, and a rod extending through an opening in each lever, said rod being received within open slots in said brackets, and said slots being upwardly and rearwardly inclined, whereby said rod and levers may be readily inserted in and removed from said brackets as a unit after the brackets are mounted in said casing, and whereby they are held against accidental displacement therefrom.

4. A phonograph disk-holder having, in combination, a plurality of disk-holding levers, each having a projecting lug near its central portion, a rod upon which said levers are pivoted, a stop rod for said levers, and a numbered plate for designating said levers, said lugs engaging said stop rod to position said levers in open position, and said lugs being themselves positioned closely adjacent said numbered plate when the levers are in closed position and acting as indicators therefor.

In testimony whereof we have hereunto set our hands.

LEANDER E. WILKINSON.
JOSEPH M. PEIRCE.

DEVICE FOR PREVENTING THE
TRANSMISSION OF SOUND,

#1,172,838-----W. C. Sabine,

Patented-February 22, 1916.

Filed-July 8th, 1914.

W. C. SABINE.
 DEVICE FOR PREVENTING THE TRANSMISSION OF SOUND.
 APPLICATION FILED JULY 8, 1914.

1,172,838.

Patented Feb. 22, 1916.

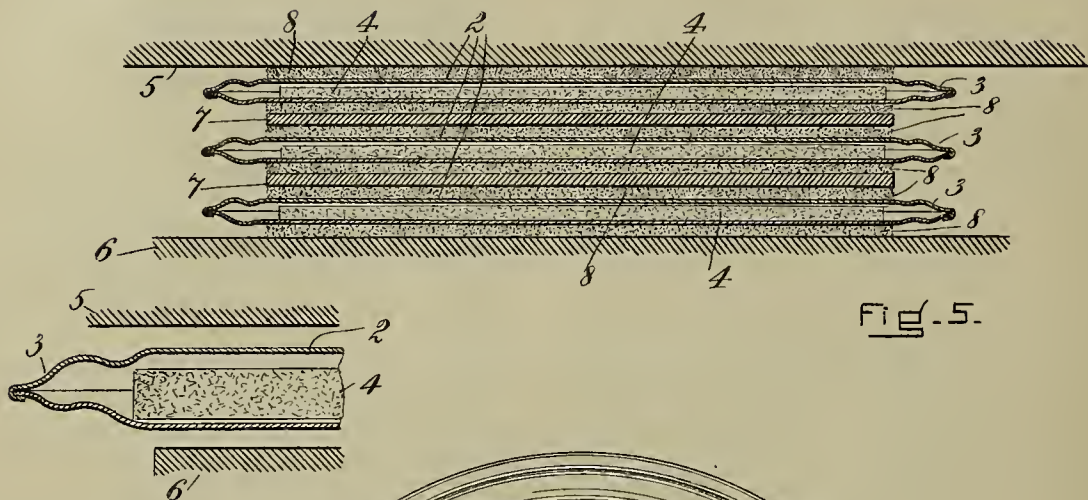


Fig. 2.

Fig. 5.

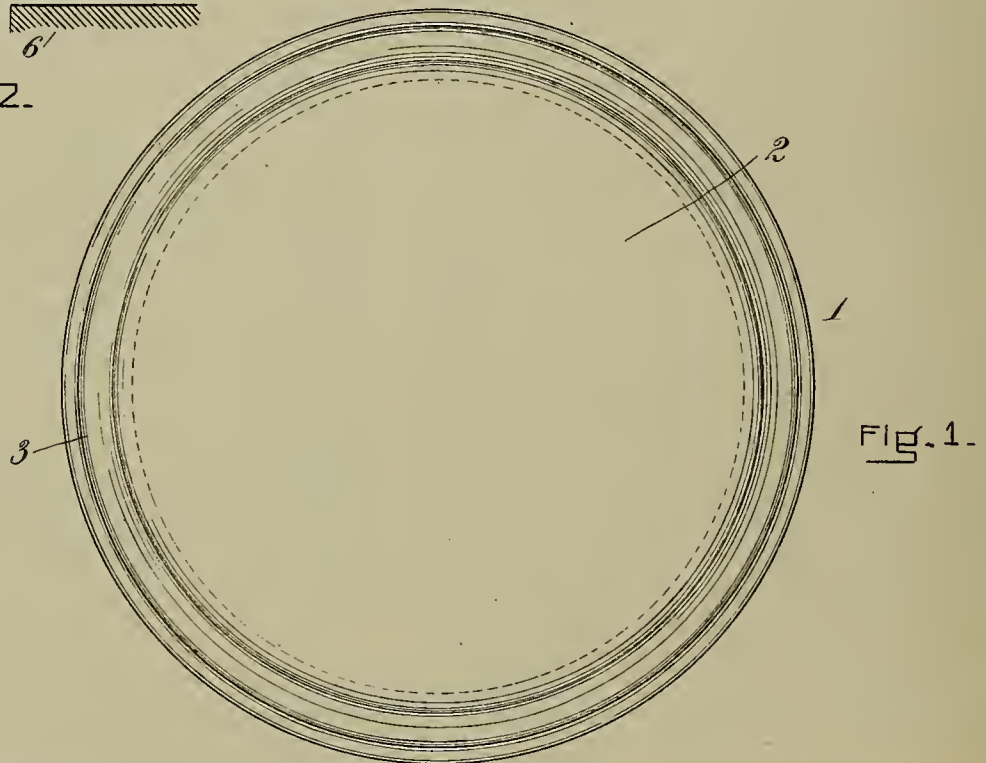


Fig. 1.

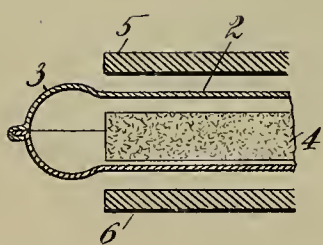


Fig. 3.

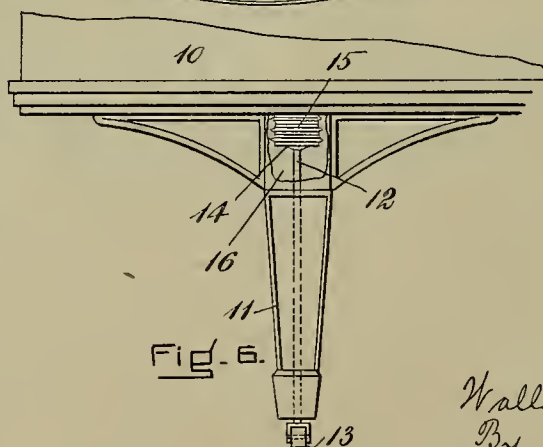


Fig. 6.

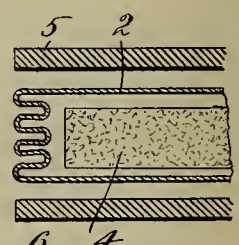


Fig. 4.

WITNESSES:
 M. E. Flaherty.
 A. C. O'Brien

INVENTOR:
 Wallace C. Sabine
 By
 Coale & Hay
 his attorneys

UNITED STATES PATENT OFFICE.

WALLACE C. SABINE, OF BOSTON, MASSACHUSETTS.

DEVICE FOR PREVENTING THE TRANSMISSION OF SOUND.

1,172,838.

Specification of Letters Patent.

Patented Feb. 22, 1916.

Application filed July 8, 1914. Serial No. 849,861.

To all whom it may concern:

Be it known that I, WALLACE C. SABINE, of Boston, in the county of Suffolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Devices for Preventing the Transmission of Sound, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification in explaining its nature.

This invention relates to a device for preventing the transmission of sound through supports or bearings subjected to pressure.

While I have in practice provided sound insulation by the employment of a discontinuity of material possessing differences in elasticity and density, as for example iron and felt, yet under conditions of pressure this fails, the pressure tending to eliminate the acoustical differences between the strata.

It is accordingly the essential object of my invention to provide for the sound insulation of objects exerting pressure by a support or bearing practically impervious to sound vibration and which will present the greatest acoustical discontinuity in its elements under those conditions of pressure to which it may be subjected.

The device embodying my invention essentially comprises a support or bearing in which the pressure is borne almost wholly by air or gaseous fluid compressed within an hermetic cell which tends to take up the vibration and the walls of which with relation to the compressed gas furnish the discontinuity producing the desired insulation.

The device comprising my invention can best be seen and understood by reference to the drawings in which is shown embodiments thereof and also an example of the application of the device.

In the drawings:—Figure 1 is a plan of one of the sound-insulating hermetic cells. Fig. 2 is a cross sectional detail of a portion of the cell in conjunction with a supported object and supporting base, these parts being shown diagrammatically. Figs. 3 and 4 are cross sectional details of modified forms of the sound-insulating cell. Fig. 5 is a cross section showing a further embodiment of the sound-insulating device, and Fig. 6 is a view partly in side elevation and partly in section of a portion of a piano body, leg and the device applied thereto for sound-insulating the body.

Referring to the drawings:—1 represents the hermetic cell containing air or other gaseous fluid. The wall 2 of the cell is made of thin metal or other material possessing radically different acoustic properties from the air within the cell. The wall is also so shaped and so compressible that in practice the load is substantially supported by the compression of air or gaseous fluid within the cell.

In order to prevent the transmission of sound through the metal around the edge of the cell and to make the cell more compressible it is provided with a flexible edge or rim 3. Such effect may be obtained in various ways as by bending or otherwise corrugating the metal around the edge or rim of the cell as shown in Figs. 2, 3 and 4. The cell is preferably made in separate half sections by dieing or stamping and the respective sections then secured together and hermetically sealed in any suitable manner as by soldering.

The cell permits of the use within it of some sound-absorbing material 4 which augments the sound insulation obtained by the cell itself in that it prevents resonance within it.

In its application the device is placed between the load or object for which the support provides a bearing, and the base to which the sound might otherwise be transmitted from the object if the device was not used. Such application is shown in Figs. 2, 3, and 4, in which 5 represents the object and 6 the base. In some cases a battery of cells is preferably employed. In such case I preferably associate with the cells one or more plates or sheets 7 of metal. These plates form not only an important factor in diminishing the transmission of sound by providing further discontinuity of media, but they also serve to distribute the pressure uniformly over the cells. To make the application of pressure still more uniform and to prevent also the touching of metal surfaces which might lead to metallic rattling, I prefer to interpose felt or other non-metallic material 8 between the plates 7 and the cell or cells 1. Owing to the fact that the felt 8 is under heavy compression it has but little effect in the insulation of sound.

The device is especially valuable in the support of pianos, the modern piano leg being admirably adapted to receive it. An

example of such application is shown in Fig. 6 where 10 represents the body of the piano, 11 the leg provided with the usual metal core 12 which forms the main support and to which the caster 13 is secured. The core 12 is provided with a supporting head plate 14 and between this plate and the body of the piano is located the insulating device comprising my invention, the same being socketed within the recess 15 preformed within the leg. With the parts thus arranged, the piano rests upon the device which in turn is supported by the core of the leg, the device preventing the transmission of sound from the body of the piano to the core of the leg and floor or base upon which the core may be resting.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States:—

1. The combination with an object exerting pressure and a base, of a sound-insulating device interposed between said object and base holding the same out of contact with one another, said device comprising an hermetic cell having a metallic shell the metal of which is flexible and under tension and which cell contains a gaseous fluid.

2. A sound-insulating device comprising an hermetic cell having a compressible, metallic shell containing a gaseous fluid and associated therewith a stratum of heavy mass.

3. A sound-insulating device comprising an hermetic cell having a compressible,

metallic shell containing a gaseous fluid and associated therewith a stratum of heavy mass and also a stratum of some sound-absorbing material.

4. A sound-insulating device comprising a compressible, hermetic cell containing both a gaseous fluid and some fibrous, sound-absorbing material.

5. A sound-insulating device comprising a compressible, hermetic cell containing both a gaseous fluid and some fibrous, sound-absorbing material, and associated therewith a stratum of heavy mass.

6. In a sound-insulating device, the combination of a plurality of hermetic cells, each having a compressible, metallic shell containing a gaseous fluid, and sound-absorbing material interposed between said cells.

7. In a sound-insulating device, the combination of hermetic cells each containing a gaseous fluid, a metallic plate, and layers of some non-metallic material interposed between said plate and said cells.

8. In a sound-insulating device, the combination of hermetic cells each containing a gaseous fluid and some sound-absorbing material, a metallic plate, and layers of some non-metallic material interposed between said plate and said cells.

WALLACE C. SABINE.

Witnesses:

JOHN E. P. HAYES,
M. E. FLAHERTY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPHOPHONE PATENT.

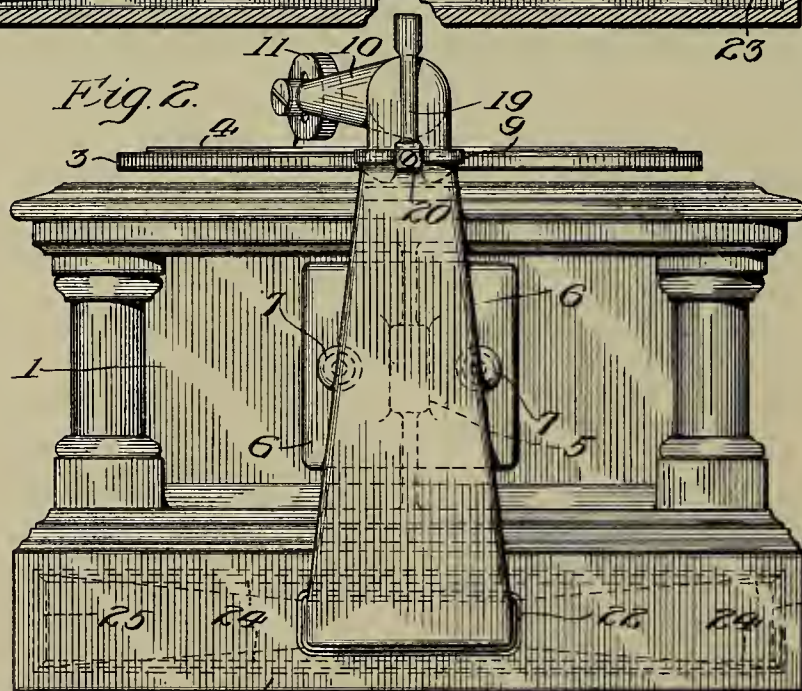
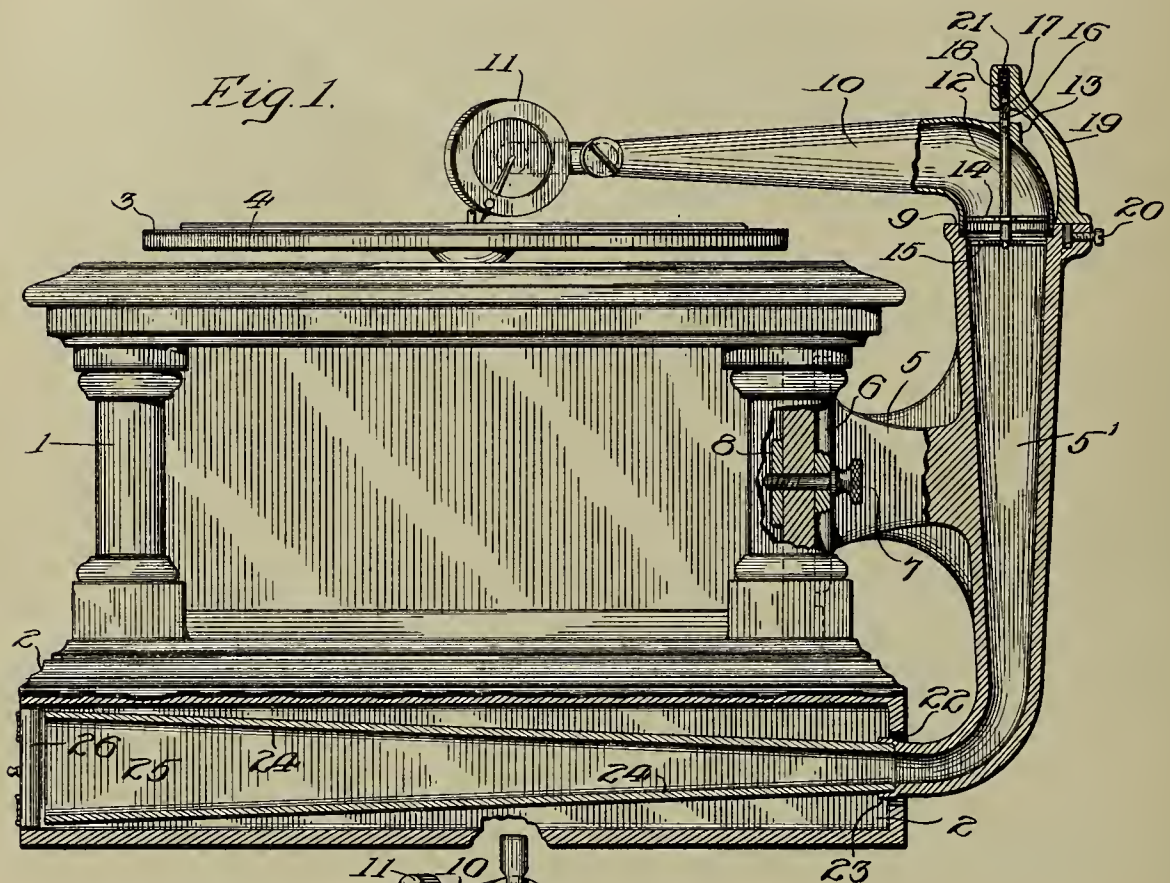
TALKING MACHINE,
#1,173,104-----J. C. English,
Patented-February 22nd, 1916.
Filed--July 31, 1907.
RENEWED-- April 11th, 1914.

J. C. ENGLISH.
TALKING MACHINE.

APPLICATION FILED JULY 31, 1907. RENEWED APR. 11, 1914.

1,173,104.

Patented Feb. 22, 1916.



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WITNESSES
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ATTORNEY

UNITED STATES PATENT OFFICE.

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TALKING-MACHINE.

1,173,104.

Specification of Letters Patent.

Patented Feb. 22, 1916.

Application filed July 31, 1907, Serial No. 386,381. Renewed April 11, 1914. Serial No. 831,341.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of Camden, State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, complete, and exact disclosure.

The main objects of this invention are to provide an improved talking machine of simple, compact, durable and efficient construction; to provide in a talking machine an improved mounting for a swinging sound box arm, and improved sound amplifying means; and to provide other improvements as will appear hereinafter.

In the accompanying drawings Figure 1 is a fragmentary side elevation partly in a vertical section of a talking machine constructed in accordance with my invention, and Fig. 2 is a rear end elevation of the same.

Referring to the drawings, one embodiment of this invention comprises a cabinet having a body or main portion 1 mounted upon a hollow base 2. Upon the top of the body 1 is mounted a horizontal turntable 3 for supporting the usual sound record 4. The body of the cabinet contains the usual motor or actuating mechanism (not shown) for rotating the turntable, and the base of the cabinet contains amplifying means described hereinafter. The body of the cabinet is separated from the base by suitable flooring which divides the cabinet into two entirely separate compartments, to prevent any noise from the actuating mechanism of the turntable from being communicated to the amplifying means.

For supporting sound reproducing means and for sound conducting and sound amplifying purposes there extends outside of the rear wall of the body of the cabinet a stationary, rigid bracket 5 which has integral therewith a flat base plate 6 resting against the outer wall of the rear side of the cabinet and projecting laterally upon each side of the main portion of the bracket. The bracket is rigidly clamped to the cabinet by bolts or thumb screws 7 which extend through holes in the base plate and through the rear side of the cabinet and are held in position by nuts 8 upon the inside of the cabinet.

The bracket 5 is provided with a hollow, vertical portion, which extends upwardly and downwardly from the central portion

of the bracket and forms a sound conveying passage 5'. The upper end of this vertical part of the bracket is substantially circular in transverse section, and terminates about on a level with the turntable of the machine in a circular socket 9, adapted to receive the larger end of a hollow tapering tone arm 10, which carries at its smaller free end a sound box 11 arranged to co-operate with the record 4. The main part of the taper arm 10 extends horizontally, and terminates at its large end in a quarter turn, which brings the lower end of the arm into the socket of the bracket heretofore described.

The taper arm is rigidly mounted upon a spindle 12, extending vertically through the larger end of the arm through a lug 13 upon the upper side of the downwardly curved part of the arm, and through a bridge 14 extending diametrically across the lower end of the arm. The spindle 12 is rotatably mounted at its lower end in a bridge 15 fixed diametrically across the upper end of the opening in the hollow bracket, and the upper end of the spindle is reduced in size to form a pintle 16, fitting into a vertical plunger 17, which is slidably carried in a socket 18 in the under side of the upper end of a solid arm 19, the lower end of which is rigidly secured to the upper end of the hollow bracket by means of a bolt 20. A spiral spring 21 is seated in the socket 18 above the upper end of the plunger, and presses the plunger downwardly, and holds it in engagement with the spindle 12. By this construction, when it is desired to remove the taper arm from its supporting bracket, the larger end of the taper arm is lifted upwardly, bringing the spindle upwardly against the yielding plunger, thus releasing the spindle from the bridge 15, and the arm may be lifted out of its socket.

The vertical portion of the hollow bracket gradually changes in its transverse sectional contour and gradually increases in transverse sectional area as it extends downwardly from the circular formation of the upper end of the bracket to an oblong, substantially rectangular formation at the lower end of the bracket. The diameter of the passage-way in the bracket, measured longitudinally of the machine, gradually decreases from the top of the bracket downwardly, and measured transversely of the machine gradually increases from the top

of the bracket downwardly, so that the side elevation (Fig. 1) presents the vertical portion of the bracket as converging downwardly, while the rear elevation (Fig. 2) presents the vertical portion of the bracket as diverging downwardly.

The lower end of the vertical portion of the bracket is given a quarter turn inwardly, and extends through an aperture 22 in the rear side of the base of the machine, without coming in contact with the base, and terminates just within the base in a socket 23, adapted to receive the inner end of the sound amplifying device, which is rigidly secured within the socket, and supported entirely by the hollow sound conveying bracket.

The amplifying device comprises upper and lower resonant flat sound boards 24 and vertical sound boards 25, secured together at their edges to form an outwardly diverging passage-way, the inner edges of these sound boards being secured within the socket at the lower end of the hollow bracket heretofore described, and the inner end of the passage-way between the sound boards communicating with the passage-way through the bracket. The outer edges of the boards terminate within the base of the machine, and are spaced a small distance from the inner side of the door 26 in the front side of the base, which extends over the outer end of the passage-way between the sound boards. The passage-way between the sound boards is thus normally in communication with the space in the base surrounding the amplifier, the passage-way, however, between the interior of the amplifier and the interior of the base being considerably less in area than the area of the outer end of the passage between the boards. By means of the doors 26 the passage-way between the boards and the chamber of the base surrounding the boards may be put in direct communication with the air surrounding the cabinet by opening the doors to get the full effect of the reproduction, or the doors may be closed or partly closed and the volume of the sound accordingly diminished.

Although only a single form has been illustrated in which this invention may be embodied, the invention obviously is not limited to this particular construction, but may be applied in other forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus fully described my invention, what I claim and desire to protect by Letters Patent is:

1. In a talking machine, the combination with a cabinet of a non-vibratory bracket secured to said cabinet, and provided with a sound conducting passage extending substantially from the top plane of the cabinet to the base thereof, a hollow sound box arm

over said cabinet and an amplifier within said cabinet and out of contact therewith carried by said bracket.

2. In a talking machine, the combination with a cabinet of a bracket secured to the exterior of said cabinet, and provided with a sound conducting passage extending substantially from the top plane of the cabinet to the base thereof, a hollow sound box arm carried by said bracket, and an amplifier within the base of said cabinet and out of contact therewith and supported by said bracket.

3. In a talking machine, a hollow bracket provided with a circular socket at its upper end, a hollow sound box arm terminating in a quarter turn downwardly and seated in said socket, a bridge across the open end of said bracket, a rigid arm projecting upwardly from said bracket and provided with a socket, and a jointed separable spindle for said sound box arm carried by said bridge and slidably resting in the socket of said rigid arm.

4. In a talking machine, a hollow bracket provided with a circular socket at its upper end, a hollow sound box arm terminating in a quarter turn downwardly and seated in said socket, a bridge across the open end of said bracket, a rigid arm projecting upwardly from said bracket and provided with a socket, a jointed separable spindle for said sound box arm carried by said bridge and slidably resting in the socket of said rigid arm, and a spiral spring in the socket of said rigid arm to hold said spindle in engagement with said bridge.

5. In a talking machine, a cabinet provided with a base portion forming a compartment, a substantially flat amplifier inclosed within said compartment and out of contact therewith and substantially filling the same, and a sound conveying bracket secured to said cabinet and supporting said amplifier.

6. In a talking machine, a cabinet provided with an aperture, an amplifier within said cabinet, and a hollow bracket mounted on the outside of said cabinet and having an end supporting said amplifier through said aperture, the amplifier and the said end of the bracket being out of contact with the cabinet.

7. In a talking machine, a cabinet provided with an aperture, an amplifier within said cabinet, a hollow bracket secured to and extending outside of said cabinet and having an end supporting said amplifier through said aperture, the amplifier and the said end of the bracket being out of contact with the cabinet, and doors adjacent the mouth of said amplifier adapted to deflect the sounds issuing therefrom.

8. In a talking machine, the combination with a cabinet, of a non-vibratory bracket

secured to and extending outside of said cabinet and provided with a sound conducting passage extending substantially from the top plane of the cabinet to the base thereof, an amplifier within the base of said cabinet and out of contact therewith supported by said bracket, and a door adjacent the mouth of the said amplifier and adapted to modify the volume of sound issuing therefrom.

9. In a talking machine, a motor-box, a motor therein, a record-support upon the top of the box adapted to be rotated by the motor, a tubular arm secured to the rear wall of the box and extending upwardly and outwardly therefrom, a sound conveyer passing through the box from the rear to the front wall thereof and communicating with said arm at its rear end, a tone-arm movably mounted upon and entirely supported by the upper end of said arm, and a sound-box carried by said tone-arm with its stylus adapted to track in the record groove of the record upon said support, substantially as set forth.

10. In a talking machine, a casing, a record support upon the casing, an upwardly extending tubular arm secured to said casing, a tone arm having one end coöperating with the upper end of said tubular arm, a sleeve mounted upon said tone arm adjacent said end thereof, a vertically disposed pin upon the upper end of said tubular arm engaging in said sleeve and a sound box carried by the free end of said tone arm.

11. In a talking machine, a casing, a tubular arm secured to said casing and extending for the greater part of its length outside of said casing, a movable tone arm mounted upon, communicating with and wholly supported by one end of said tubular arm, a sound box carried by said tone arm and communicating therewith, and an amplifier within said casing communicating with the other end of said tubular arm.

12. In a talking machine, a casing, a record support upon the casing, a tubular arm secured to the rear wall of the casing and extending upwardly outside of said casing, a sound conveyer within the casing and communicating with the lower end of said tubular arm, a tone arm movably mounted upon and entirely supported by and communicating with the upper end of said tubular arm, and a sound box carried by said tone arm and adapted to coöperate with a record carried by said record support.

13. In a talking machine, the combination with a cabinet of a bracket secured to and extending outside of said cabinet and provided with a sound conducting passage therethrough, a hollow sound-box arm entirely supported by said bracket, and sound amplifying means supported within said cabinet, but out of contact therewith, by said bracket.

14. In a talking machine, the combination with a cabinet providing a compartment, of a hollow sound conducting bracket projecting freely through a wall of said compartment and sound amplifying means within said compartment and entirely supported by said bracket.

15. In a talking machine, the combination with a cabinet providing a compartment, of a hollow sound conveyer secured to said cabinet and projecting freely through a wall of said compartment, sound reproducing means outside of said compartment and communicating with said conveyer and sound amplifying means extending within said compartment and communicating with and entirely supported by said conveyer.

16. In a talking machine, the combination with a cabinet providing a compartment, of a hollow bracket secured to said cabinet and projecting freely through a wall of said compartment, the major portion of said bracket being outside of said compartment, and sound amplifying means extending within said compartment and entirely supported by said bracket.

17. In a talking machine, the combination with a cabinet providing a compartment, of a hollow bracket secured to said cabinet and projecting freely through a wall of said compartment, and a hollow movable tone arm outside of said compartment and entirely supported by said bracket and communicating therewith.

18. In a talking machine, the combination with a cabinet providing a compartment, of an element secured to said cabinet and providing a sound passage inclosed by a comparatively rigid wall having an oblong outlet, the major axis of which is considerably greater than its minor axis, sound reproducing means outside of said compartment, and sound amplifying means including a sounding board in said compartment and communicating with said reproducing means through said outlet.

19. In a talking machine, the combination with a cabinet providing a compartment, of an element secured to said cabinet and providing a sound passage inclosed by a comparatively thick and non-vibratory wall, a sound box arm outside of said compartment and entirely supported by said element, and sound amplifying means in said compartment and entirely supported by said element and communicating with said sound box arm through said passage.

20. In a talking machine, the combination with a cabinet providing a compartment, of a bracket including a base and a hollow portion forming a sound conduit, said base being secured to said cabinet and forming the sole support of said bracket and said bracket being otherwise free of said cabinet, a sound box arm movably mounted upon and en-

tirely supported by said bracket and extending outside of said compartment and sound amplifying means arranged within said compartment but entirely out of contact with the walls thereof and supported by said bracket and communicating therethrough with said sound box arm.

21. In a talking machine, hollow sound conveying means having a substantially circular opening at one end and a substantially oblong opening at the other end, the axes of said oblong opening being respectively greater and not greater than the diameter of said circular opening.

22. In a talking machine, hollow sound conveying means having a substantially circular opening at one end and a substantially oblong opening at the other end, the axes of said oblong opening being respectively greater and not greater than the diameter of said circular opening, and said sound conducting means merging gradually from the form of the opening at one end into the form of the opening at the other end.

23. In a talking machine, the combination with a cabinet, of a bracket attached to the exterior of the cabinet and having an upright passage, the passage having a circular opening at its upper end and an oblong opening at its lower end, the axes of said oblong opening being respectively greater and not greater than the diameter of said circular opening, sound reproducing means communicating with said circular opening, and sound amplifying means within the cabinet and communicating with said oblong opening.

24. In a talking machine, the combination with a cabinet having a base portion forming a separate compartment, of a hollow bracket extending on the exterior of the cabinet, a sound box arm communicating with and mounted on an end of the bracket, and an amplifier within the base of the cabinet and communicating with the other end of the bracket.

25. In a talking machine, the combination with a cabinet having superimposed separate compartments, a record support upon said cabinet, actuating mechanism within the upper compartment, a hollow bracket extending on the exterior of the cabinet, a sound box arm mounted on an end of the bracket and movable over the record support, and an amplifier within the lower compartment and communicating with the other end of the bracket.

26. In a talking machine, the combination with a cabinet, actuating mechanism within the cabinet in the upper portion thereof, a hollow bracket secured to the cabinet and extending on the exterior thereof, a sound

box arm mounted on one end of the bracket, and an amplifier communicating with the other end of the bracket and located within the cabinet below the actuating mechanism, the amplifier being entirely supported by the bracket.

27. In a talking machine, the combination with a cabinet having therein a sound amplifying chamber, of a hollow non-vibratory bracket secured to a wall of said cabinet and extending on the exterior of said cabinet, said bracket having a sound conveying passage throughout the length thereof, said passage being substantially circular in cross section at one end and substantially rectangular in cross section at the other end, and a sound conveying arm communicating with and entirely supported by said circular end of said bracket, said rectangular end of said bracket being in communication with said chamber.

28. In a talking machine, the combination of a cabinet provided with a sound amplifying chamber, a hollow non-vibratory bracket secured to said cabinet and extending on the exterior thereof, said bracket having a sound conducting passage extending throughout its length and communicating at one end with the interior of said chamber, and a hollow sound box arm mounted on and entirely supported by the other end of said bracket and communicating through said bracket with the interior of said chamber.

29. In a talking machine, the combination with a cabinet having a compartment therein, provided with an opening through a wall of said compartment, of a rigid non-vibratory hollow bracket secured to and extending outside of said cabinet, and sound conveying means communicating with one end of said bracket and supported entirely thereby, the other end of said bracket passing through the opening in said compartment.

30. In a talking machine, the combination with a cabinet having a compartment therein and provided with an opening through an external wall of said compartment, of a hollow non-vibratory bracket secured to said cabinet and extending on the exterior of said cabinet with one end in alinement with said opening in said wall, and a hollow tone arm entirely supported by and in communication with the other end of said bracket.

In witness whereof I have hereunto set my hand this thirtieth day of July, A. D., 1907.

JOHN C. ENGLISH.

Witnesses:

ALSTON B. MOULTON,
ALEXANDER PARK.

NEEDLE SETTER,

1,173,251-----F. A. Chapin,

Patented-February 29th, 1916.

Filed-September 4th, 1914.

F. A. CHAPIN.
NEEDLE SETTER.
APPLICATION FILED SEPT. 4, 1914.

1,173,251.

Patented Feb. 29, 1916.

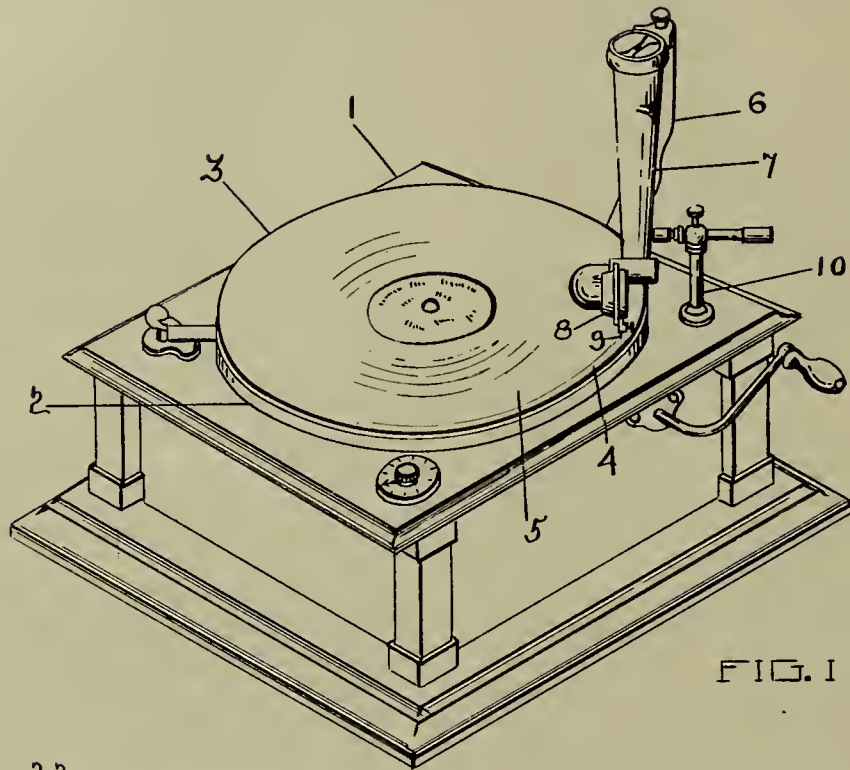


FIG. 1

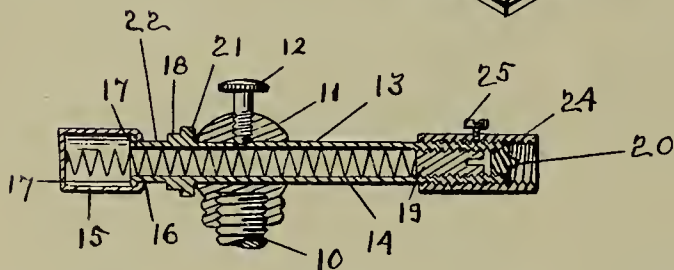


FIG. 2

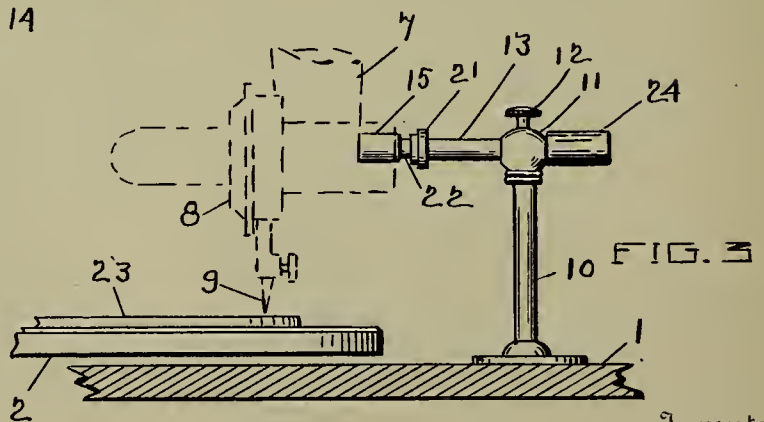


FIG. 3

Witnesses
Gladys Jameson.
C. H. Rauch

Frederick A Chapin

By

Geo E Kirk

Attorney

UNITED STATES PATENT OFFICE.

FREDERICK A. CHAPIN, OF TOLEDO, OHIO.

NEEDLE-SETTER.

1,173,251.

Specification of Letters Patent.

Patented Feb. 29, 1916.

Application filed September 4, 1914. Serial No. 860,127.

To all whom it may concern:

Be it known that I, FREDERICK A. CHAPIN, a citizen of the United States of America, residing at Toledo, Ohio, have invented new and useful Needle-Setters, of which the following is a specification.

This invention relates to means for positioning a member for coaction with another member for subsequent relative travel therebetween.

This invention has utility when incorporated in connection with reproducing mechanisms, especially sound reproducers of the disk record type.

Referring to the drawings: Figure 1 is a perspective view of an embodiment of the invention in connection with a disk record sound reproducer; Fig. 2 is a longitudinal section, on an enlarged scale, of features of the device of the invention; and Fig. 3 is a side elevation of the device, adjusted for use in connection with a different diameter record than the showing in Fig. 1, with a fragment of the machine shown.

The sound reproducing machine may embody the main frame 1 having mounted thereon the rotatable platform 2 for supporting the disk record 3 having adjacent the outer periphery a non-reproducing portion 4, and surrounded by this non-reproducing portion 4, a reproducing portion 5.

Carried by the frame 1 is the bracket 6 upon which is mounted the arm 7 pivoted to swing across the face of the record 3. The free end of the arm 7 carries the sound box 8 in which is mounted the needle 9 disposed to rest upon or contact the record 3 for sound reproduction by relative travel in the grooves or sound reproducing portion 5 of the record 3.

The device of the invention is disposed for limiting the swing of the arm 7 in bringing the needle 9 into starting position. This swing of the arm 7 is with the sound box 8 so turned that the needle is free of the record 3. When the swing of the arm 7 is in the region of the periphery of the record 3, the needle is swung downward into record contacting position, after the record is under speed. This setting of the needle should be accurately done in the outermost groove in an easy manner to avoid injury to the record.

Mounted on the frame 1 adjacent the rotating platform 2 is the support or upright 10, having the transversely perforate

head 11 provided with a set screw 12 adjustable to engage the tube 13 having therein the compression spring 14 retained by the head 15 held thereon by the inwardly spun lip 16 behind the rib 17 on the end of the tube 13. The collar 18 limits the inward travel of the head 15 by the lip 16 coacting therewith. The compression of the spring 14, and therefore, its active strength may be adjusted by the screw 19 in the tube 13, while the plug 20 may be inserted in the open end of the tube 13 to cause it to present a more slightly appearance.

In positioning the upright 10, the arm 7 may be swung to such position that the needle 9 when dropped to position will fall just inside the periphery of the smaller, if there be variation in diameter, of the full or maximum size records for which the platform 2 is designed. The upright is then placed so that the collar 21 on the tube 13 abuts the head 11, and the set screw 12, is rotated to lock the member 13 in this position, with the head 15 compressing spring 14 and contacting or coacting with some movable part of the pivoted or swinging members, as the arm 7.

To operate the device, the machine is started in the usual way, and then the arm swung over to abut the buffer head 15 and compress the spring 14. The needle 9 is then permitted to contact the record portion 4, and the yieldable member 15 at once gently comes into action to shift the needle 9 across the non-reproducing portion 4 of the record member 3 into the outermost reproducing groove, so that reproduction begins at once. The great advantage of the device is that the setting may be accomplished quickly with any change of records of the taken general size and without the least study or eye strain for locating the point or scratching the record by manually forcing the needle thereon. It will be thus seen, without any illumination whatever, the needle may be set for reproduction. With nicety in spring adjustment, the shifting of the buffer head 15 may just overcome the resistance of the arm 7, which is very slight during the rotation of the record, and the needle resting thereon. The length of the section 22 between the ribs 17, 18 may be in excess of the maximum variation of the non-reproducing portions 4, or approximating such variation, and the actual shift-

ing may be such that in the quiet travel of the needle 9 to the outermost groove, the impetus given is just sufficient to free the arm 7 from the head 15 as the outermost
 5 groove is entered by the needle. This adjustment with the light weight spring 14 is readily possible.

In instances where a smaller standard record is used, say from a 12" to a 10" size,
 10 the smaller record 23 (Fig. 3) is spaced inward more from the upright 10, but as the same general range of conditions are to be found here, there need not be re-adjustment of the spring 14, nor a resetting of the up-
 15 right 10. The set screw 12 may be loosened and the tube 13 thrust inward to bring the needle 9 within the periphery of the smallest of the standard 10" records, and then a collar 24 rotated up to position to
 20 abut the head 11, where it may be locked by a set screw 25, while the tube 13 is held there by the set screw 12.

With the positioning of the standard 10 bringing the collar 21 into play there is a
 25 ready adjustment for determining limiting position for locking the tube 13 by the set screw 12 for one range of records. Even while the operator is getting the disk under speed for swinging the needle down into
 30 position, shifting of the adjustment by loosening the set screw 12, may occur to bring the collar 21 or the collar 24 into contacting position with the head 11, to provide for the automatic needle setting or
 35 shifting as the general standard size of the disk may require. The handling is not difficult, and the device is simple, reliable and

ornamental, as well as of material assistance in the proper machine operation.

What is claimed and it is desired to se- 40
 cure by Letters Patent is:

1. A setting device for sound reproducers including a relatively fixed element, a member slidably mounted therein, a head mount-
 45 ed on and for independent sliding movement relatively to the member, and a spring arranged within the member and resisting sliding movement of the head.

2. A setting device for sound reproducers including a fixed upright, a tube slidably
 50 mounted in the upright, a head slidably mounted on the tube, a spring arranged within the tube and resisting sliding movement of the head in one direction, and means carried by the tube to limit its slid-
 55 ing adjustment in the upright.

3. A setting device for sound reproducers including a fixed upright, a tube slidably
 60 mounted in the upright, a head slidably mounted on the tube, a spring arranged within the tube and resisting sliding movement of the head in one direction, a fixed stop carried by the tube to limit movement of the tube in the upright in one direction,
 65 and a second stop adjustably carried by the tube to limit movement of the tube in the upright in the opposite direction.

In testimony whereof I affix my signature in the presence of two witnesses.

FREDERICK A. CHAPIN.

Witnesses:

GEO. E. KIRK,

GLADYS JAMESON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

RESONATOR FOR SOUND REPRODUCING
DEVICES,

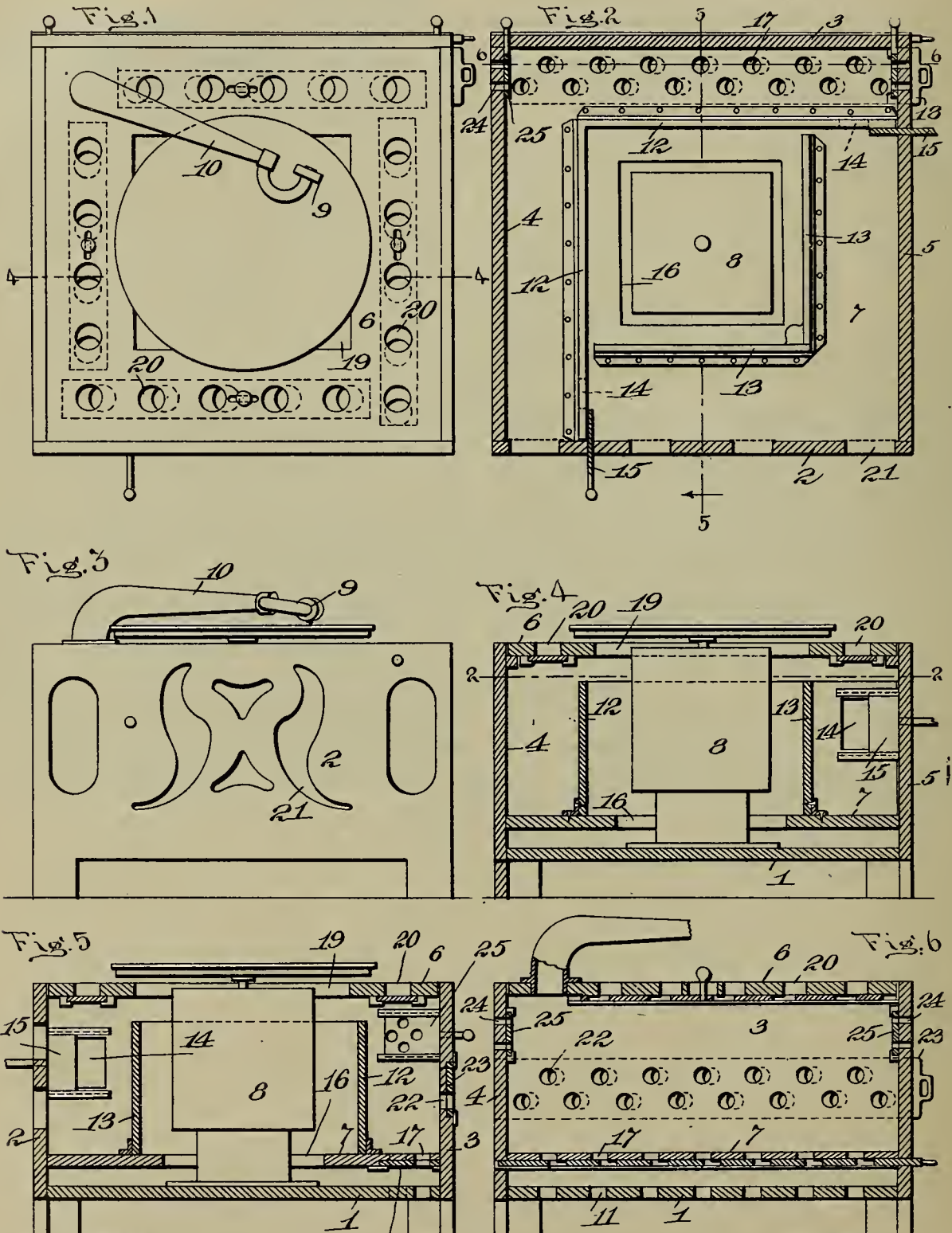
1,173,272-----W. B. Hollingshead,
Patented-Feb. 29th, 1916.
Filed-Nov. 17th, 1913.

W. B. HOLLINGSHEAD.
 RESONATOR FOR SOUND REPRODUCING DEVICES.
 APPLICATION FILED NOV. 17, 1913.

1,173,272.

Patented Feb. 29, 1916.

2 SHEETS—SHEET 1.



Witnesses:

Herbert W. Weise
 Elijah F. Munn, Jr.

Inventor

William B. Hollingshead,
 by John L. Lotzsch

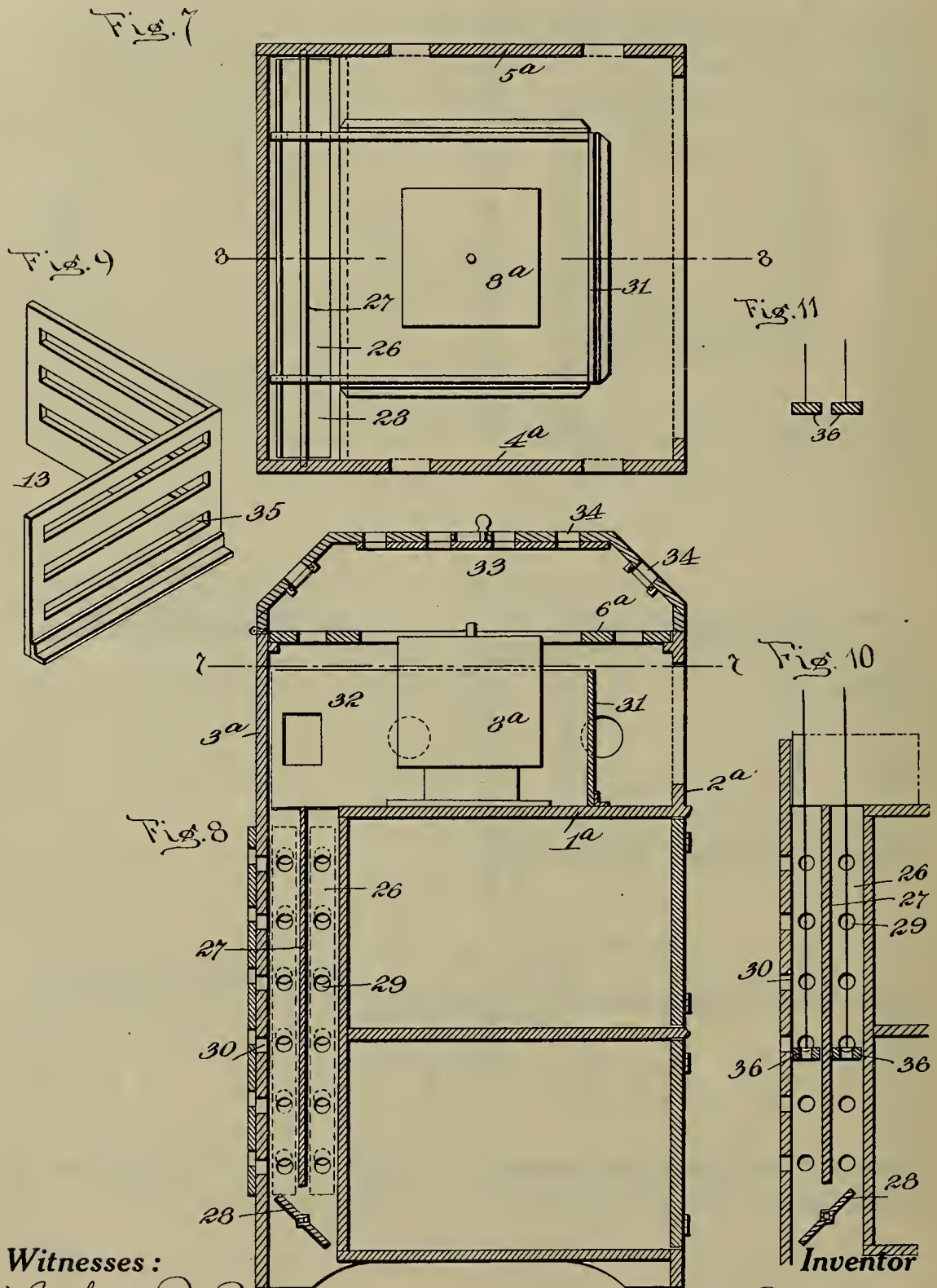
Attorneys.

W. B. HOLLINGSHEAD.
 RESONATOR FOR SOUND REPRODUCING DEVICES.
 APPLICATION FILED NOV. 17, 1913.

1,173,272.

Patented Feb. 29, 1916.

2 SHEETS—SHEET 2.



Witnesses:

Herbert D. Weise

Elijah T. Munn, Jr.

William B. Hollingshead,
by John L. Lotzsch
his Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM B. HOLLINGSHEAD, OF MOUNT VERNON, NEW YORK, ASSIGNOR OF ONE-HALF
TO WALDO G. MORSE, OF YONKERS, NEW YORK.

RESONATOR FOR SOUND-REPRODUCING DEVICES.

1,173,272.

Specification of Letters Patent.

Patented Feb. 29, 1916.

Application filed November 17, 1913. Serial No. 801,471.

To all whom it may concern:

Be it known that I, WILLIAM B. HOLLINGSHEAD, a citizen of the United States, residing in the city of Mount Vernon, county of Westchester, and State of New York, have invented a certain new and useful Resonator for Sound-Reproducing Devices, of which the following is a specification.

10 In the following specification I will describe my improved resonator in connection with a talking machine, but it is obvious that it may be used in other situations.

15 The object I have in view herein is to provide a resonator for talking machines or the like in which the megaphone or horn is entirely eliminated.

20 A further object is to produce a device in which the intensity of the sounds may be increased or diminished.

A further object is to increase the volume of tone by inserting, in the path of the sonorous waves, bodies capable of vibrating together with the principal vibrating body. 25 These vibrating bodies or septa are rigidly attached to the body of the resonator which incloses the talking machine mechanism and with which the tone arm of the talking machine communicates. The septa have free edges which are capable of free vibration. 30 The septa may be made of variable thickness or may be weighted to synchronize them, and the walls of the resonator or cabinet are provided with valved openings for the escape of the amplified sound waves. 35

In the drawings I have illustrated my invention in connection with a phonograph of the disk type, but it is to be understood that I do not limit my invention to machines of this character, and that my invention is equally adaptable to talking machines of the cylindrical type. 40

These and further objects will more fully appear from the following specifications and accompanying drawings, considered together or separately, in which— 45

Figure 1 is a plan view of my improved resonator showing the same applied to a disk record talking machine. Fig. 2 is a horizontal section on the line 2—2 of Fig. 4. Fig. 3 is a front elevation of the device. Fig. 4 is a section on the line 4—4 of Fig. 1. Fig. 5 is a section on the line 5—5 of Fig. 2. Fig. 6 is a section on the line 6—6 of Fig. 2. Fig. 7 is a horizontal sectional 55

view of a modification, the section being taken on the line 7—7 of Fig. 8. Fig. 8 is a section on the line 8—8 of Fig. 7. Fig. 9 is a perspective view of a modified form of septum. Fig. 10 is a detail view of a further modification. Fig. 11 is a detail view of a still further modification showing a pair of unperforated diaphragms. 60

In all views, like parts are designated by the same reference characters. 65

1 represents the bottom of the resonator, and 2, 3, 4 and 5 the front, rear and side walls thereof.

6 represents a removable diaphragm covering the resonator, and 7 a perforated diaphragm situated a short distance above the bottom 1. 70

The bottom 1 carries a motor 8 of any suitable construction, and the motor is provided with the usual turntable on which the record rests. Coöperating with the record is a sound box 9 of any well known type. The sound box is carried by and communicates with a sound arm 10. The sound arm offers a free passage between the sound box and the interior of the resonator. The bottom 1 is provided with a series of openings 11 to allow for the passage of air. 75

Rigidly secured to the diaphragm 7 are vibratory septa 12—12 and 13—13. These septa are free except where secured to the diaphragm, and the septa 12—12 are provided with openings 14—14. Slides 15—15 operatable from the exterior of the resonator are provided to close or disclose the openings 14—14. 80

The diaphragm 7 is provided with an opening 16 through which the standard of the motor passes, and with a series of perforations 17 for the admission of air to the resonator. The openings 17 are controllable by means of a valve 18. 85

The diaphragm 6 has an opening 19 through which the shaft of the motor projects and is further provided with a plurality of valved openings 20 for the escape of sound waves. The front 2 is provided with sound openings 21, and these openings may be covered with gauze, as is usual, to prevent the entrance of dust, etc., and all other openings may be covered with gauze. The rear wall 3 is equipped with a series of openings 22, and a slide 23 is used to open or close the same. The side walls 4 and 5 are each perforated as at 24—24 and 100 105 110

dampers 25—25 are used to control such perforations.

It will be obvious that only one or any number of septa may be used if desired.

5 It will be obvious that the septa 12 and 13 may be secured to the diaphragm 6, or to either of the walls 2, 3, 4 and 5 instead of to the diaphragm 7 without departing from the spirit or scope of my invention.

19 In Figs. 7 and 8, I show a modification of my improved resonator in which the device is used in connection with a cabinet for storing records, etc. In this case I provide a duct 26 for affording an air passage from below the cabinet to the resonator. The duct is provided with a partition 27 extending entirely across it and with a damper 28 for governing the admission of air and the egress of sound waves. The side and rear walls of the duct are provided with valved openings 29 and 30. The front, side and rear walls and the partition of the duct are resonant and in addition the partition is free to vibrate.

25 The septa 31 of Figs. 7 and 8 are arranged in U-shape; are secured to the bottom 1^a which supports the motor 8^a and extend across the duct 26 almost to the rear wall 3^a. The height of the septa, as in those shown in Figs. 4 and 5 is somewhat less than the height of the chamber of the resonator. This allows for the free passage of the sound waves over the free edges of the septa. The side septa, as shown in Fig. 8 are provided with openings 32.

The cabinet shown in Fig. 8 is provided with a cover 33 and this cover is pierced by a plurality of openings 34. These openings are governed by sliding valves.

40 In order to increase the vibratory effect of the septa they may be pierced so as to produce a large number of vibrating edges. In Fig. 9, I have shown a pair of septa provided with a plurality of elongated slots 35, but it will be understood that openings of any other shape or configuration may be employed.

50 If desired the reflecting and deflecting surfaces may be coated with a non-absorbent material which will act as a damper or softener of the vibrations, which impinge upon them and will also act as a retarding agent and give sharper definition to pulses.

55 In Fig. 10, I show a modification wherein the ducts 26, in addition to the damper 28 are provided with adjustable perforated diaphragms 36 for the purpose of lengthening or shortening the effective length of the ducts.

60 The operation is as follows: The sonorous waves emanating from the sound box 9 will traverse the sound arm 10 and be discharged into the resonator, and projected in all directions. They will then strike against the walls of the chamber, be repeatedly sent

back from them by reflection. The sound wave in its passages back and forth in the chamber will come in contact with the septa and the free edges of the septa will be caused to vibrate in unison with the principal vibrating body, *i. e.*, the diaphragm of the sound box.

By attuning the septa by varying their thickness or by weighting them, attuning the walls of the chamber and by adjusting the valves of the various openings in the walls of the chamber, and in the septa, it is possible to produce notes of great intensity and loudness.

80 In accordance with the provisions of the patent statutes, I have described the principle of my invention together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is merely illustrative, and that the invention can be carried out in other ways.

Having now described my invention, what I now desire to secure by Letters Patent is:

90 1. In a talking machine the combination with a sound box, of a resonant casing in communication with the sound box, a plurality of vibratory bodies within the casing and valved openings in the bodies.

95 2. In a talking machine the combination with a sound box, of a resonant casing in communication with the sound box, vibratory bodies within the casing, and a diaphragm, to which the bodies are attached by one edge only within the casing.

100 3. In a talking machine the combination with a sound box, of a resonant casing in communication with the sound box, a bottom for the casing, openings in the bottom, a diaphragm in the casing above the bottom and an opening in the diaphragm.

105 4. In a talking machine the combination with a sound box, of a resonant casing in communication with the sound box, a bottom for the casing, openings in the bottom, and a diaphragm in the casing above the bottom, said diaphragm carrying vibratory bodies, and openings in the diaphragm.

110 5. In a talking machine the combination with a sound box, of a resonant casing in communication with the sound box, a bottom for the casing, openings in the bottom, a diaphragm carrying vibratory bodies, and openings in the bodies.

115 6. In a talking machine the combination with a sound box, of a resonant casing in communication with the sound box, a bottom for the casing and openings in the bottom, a diaphragm carrying vibratory bodies, openings in the bodies, and valves for closing and disclosing the openings.

120 7. In a talking machine, the combination with a sound box, and a resonant casing in communication therewith, of a box-like vibratory body within the casing, an opening 130

in the body, and a valve for closing and disclosing such opening.

8. In a talking machine, the combination with a sound box, of a resonant casing in communication therewith, openings in all sides of the casing, a diaphragm within the casing, and openings in the diaphragm.

9. In a talking machine, the combination with a sound box, of a resonant casing in communication therewith, openings in all sides of the casing, a diaphragm within the casing, and openings in the diaphragm, and a valve for closing and disclosing the openings in the diaphragm.

10. A talking machine comprising a rectangular casing, a motor therein, a turntable above the top of the casing driven by

the motor, a tone-arm pivotally mounted at one corner of the top of the casing, a sound box carried by the tone-arm and adapted to coact with a record on the turntable, said tone-arm communicating with the interior of the casing, a diaphragm within the casing, a box-like vibrator body secured along one of its sides to the diaphragm and surrounding the motor, openings in the body, and openings in all sides of the casing.

This specification signed and witnessed this 29th day of October, 1913.

WILLIAM B. HOLLINGSHEAD.

Witnesses:

J. SCHECHTER,
M. JONES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

1,173,316

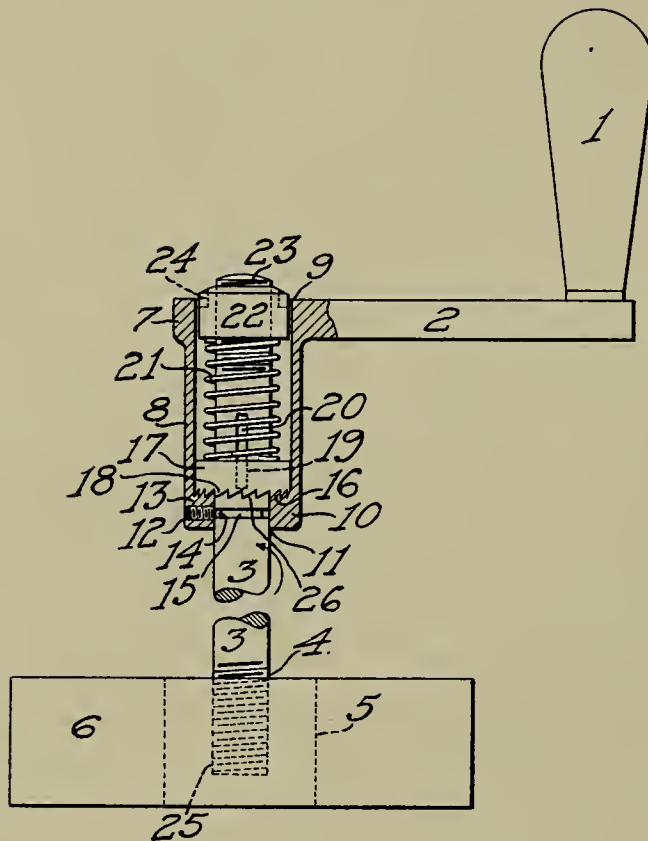
HANDLE FOR WINDING PHONOGRAPH SPRING
MOTORS,

1,173,316-----S. Segal,
Patented-Feb. 29th, 1916.
Filed-June 28, 1915.

S. SEGAL.
HANDLE FOR WINDING PHONOGRAPH SPRING MOTORS.
APPLICATION FILED JUNE 28, 1915.

1,173,316.

Patented Feb. 29, 1916.



Witnesses:
M. E. Levy
O. E. Hart

Inventor
Samuel Segal,
By his Attorney
Benjamin Roman.

UNITED STATES PATENT OFFICE.

SAMUEL SEGAL, OF NEW YORK, N. Y.

HANDLE FOR WINDING PHONOGRAPH SPRING-MOTORS.

1.173,316.

Specification of Letters Patent.

Patented Feb. 29, 1916.

Application filed June 28, 1915. Serial No. 36,660.

To all whom it may concern:

Be it known that I, SAMUEL SEGAL, a citizen of the United States, and resident of the city of New York, in the county of New York and State of New York, have invented a certain new and useful Handle for Winding Phonograph Spring-Motors, of which the following is a specification.

This invention relates to operating mechanism for phonographs or to kindred mechanism wherein a spring motor is utilized to provide the motive power for running the mechanism. The springs of such motors require frequent winding and in the case of phonograph motors the operator must apply considerable force upon the winding handle thereof in order to wind the motor spring. Due to this difficulty of winding the phonograph motor-spring considerable inconvenience is usually experienced in that the operator does not know, on account of the great resistance offered by the spring near the culmination of winding, as to whether the winding has been completed or not. And frequently, the operator, not having such knowledge, applies undue force at the actual termination of the winding and thereby causes accidental snapping or breaking of the motor-spring, or impairment of its effectiveness.

The principal object of my invention is to provide an improved winding-handle for the phonograph spring-motor, wherewith the spring of the motor may be efficiently wound, and by the use of which accidental breaking or impairment of the spring will be prevented.

Another object is to provide an improved winding handle, for the phonograph-motor, which at the termination of the winding of the spring will apprise the operator that the spring has been fully wound and that no further turning of the handle is necessary.

Other objects and advantages will hereinafter appear.

The accompanying drawing shows a general sectional elevation of a phonograph spring-motor handle embodying the invention.

The handle proper comprises a knob 1, a lever 2 the extremity of which carries said knob, and a shaft or stem 3 which has its end 4 adapted to thread into the axle 5 of a motor-spring 6 that forms part of the driv-

ing mechanism of the phonograph. At the opposite extremity 7 of lever 2 is formed a hollow cylindrical hub or casing 8 that extends from the lever in a direction opposite to the knob 1. Said casing has one end 9, at lever 2, open and its opposite end 10 is closed and provided with a bearing-opening 11 which is adaptable to be rotatably mounted over the stem 3. A screw 12 threads through an opening 13 in casing-end 10 and is provided with a projection 14 which enters into an annular groove 15 in stem 3, whereby longitudinal movement of casing 8 along said stem is prevented while said casing is permitted to rotate around the stem and relatively thereto. The casing 8, preferably made of cast metal, has a series of ratchet teeth 16 constituting a clutching-member cast around the opening 11 upon the inner side of its end 10.

A collar 17 having ratchet teeth 18 similar to teeth 16 and constituting a cooperating clutching-member is adapted to slip over the end of stem 3 and is provided with a feather 19 that projects within a keyway 20 formed within said stem, by means of which said collar is capable of being slid longitudinally along the stem 3 while rotation or lateral movement thereof around said stem is prevented. Beyond the collar 17 and within the casing 8 is located a spring 21, wound around the stem 3, which normally presses said collar against the casing-end 10 and causes the teeth 16, 18 to interlock and thereby clutch the stem 3 with the casing 8. A nut 22 threads over the extremity 23 of stem 3 against the spring 21 and compels it to press against the collar 17. By threading said nut along the stem it may be set to cause the spring 21 to exert any degree of pressure desired against the collar 17 and to thereby regulate the pressure of the clutching teeth 16, 18 against each other. As the nut 22 is wholly or almost wholly within the casing 8 threading thereof is effected by means of a pronged key, not shown, inserted within openings 24 provided therein.

The spring-handle is usually made removable so that it may be kept away from the machine in order to prevent unauthorized playing of the phonograph, and when it is desired to wind the spring-motor the stem 3 is inserted through an opening in the phono-

graph-casing, not shown, and its end 4 is threaded wholly within a tapped opening 25 in the spring-axle 5 by turning of the lever 2 with the knob 1. Due to the clutch-
 5 ing of the teeth 16, 18, further revolution of the lever 2 causes the stem 3 to be rotated in the direction of the arrow and to thereby wind up the motor-spring 6. Upon
 10 termination of the winding the spring-motor 6 prevents further rotation of the stem 3 and its splined collar 17, and hence as the lever 2 is turned further the inclined surfaces 26 of the casing-teeth 16 are caused to
 15 forcibly press against their cooperating clutching-teeth 18 and thus compel the collar 17 to move away therefrom contrary to the pressure of spring 21. Further revolution of the lever 2 therefore causes the casing-teeth 16 to ratchet by the teeth 18 and
 20 thereby permits idle rotation of said lever and the casing 8 without rotating or affecting the stem 3. The sound of the ratcheting of teeth 16, 18 at once apprises the operator that the motor-spring has been fully
 25 wound and that no further revolving of the lever 2 is necessary. By means of the adjustment nut 22 the pressure of the clutching members against each other may be so regulated that the teeth 16, 18 will ratchet
 30 just as soon as slightly greater force is applied upon the handle than that required to turn it when at the termination of the winding. Upon turning of the lever 2 and stem 3 oppositely, contrary to the direction of the
 35 arrow, the teeth 16, 18 interlock positively and the handle may be readily unthreaded and removed from the phonograph.

It will be evident that by means of this handle the motor spring may be efficiently
 40 wound and accidental breaking of the spring or detrimental effect thereupon prevented. The operating mechanism of the handle being entirely within the cylindrical hub or casing 8 it is well protected at all times, and
 45 due to said mechanism being thus entirely concealed from view it lends a neat and regular appearance to the handle.

Variations may be resorted to within the scope of the invention.

50 Having thus described my invention, I claim:—

1. The combination with a motor-spring, of a winding stem therefor, a casing mounted to rotate about said stem and held against
 55 longitudinal movement therealong, said casing having a clutch member rotatable therewith, a cooperating clutch member within said casing mounted to slide longitudinally along said stem and held against
 60 lateral movement, a spring around said stem pressing said latter clutch member against said former, a nut threading along said stem for adjusting the pressure of said spring, and an operating lever extending from said
 65 casing for rotating the casing, said rotatable

clutch member engaging its cooperating member to rotate said stem for winding the motor spring and passing by said member without affecting said stem at the termination of the winding. 70

2. The combination with a motor spring, of a winding stem therefor, a casing mounted to rotate about said stem and held against longitudinal movement therealong, said casing having a clutch member rotatable therewith, a cooperating clutch member within
 75 said casing mounted to slide longitudinally along said stem and held against lateral movement, a spring pressing said latter clutch member against said former, and means to regulate the pressure of said
 80 spring, said rotatable clutch member engaging its cooperating member to rotate said stem for winding the motor spring and passing by said cooperating member without affecting said stem at the termination of winding. 85

3. The combination with a motor spring, of a winding stem therefor, a casing mounted to rotate about said stem, said casing having a clutch member rotatable therewith, a cooperating clutch member mounted on said
 90 stem within said casing, and a spring pressing said clutching members toward each other, said rotatable clutch member engaging its cooperating member to rotate said
 95 stem for winding the motor spring and passing by said cooperating member without affecting said stem at the termination of winding. 100

4. The combination with a motor spring, of a winding stem therefor, a casing mounted to rotate about said stem and held against longitudinal movement therealong, said casing having a clutch member rotatable therewith, a cooperating clutch member within
 105 said casing mounted to slide longitudinally along said stem and held against lateral movement, and a spring pressing said latter clutch member against said former, said rotatable clutch member engaging its cooperating member to rotate said stem for winding the motor spring and passing by said cooperating member without affecting said
 110 stem at the termination of winding. 115

5. The combination with a motor spring, of a winding stem therefor, a clutch member mounted to rotate about said stem and held against longitudinal movement therealong, a cooperating clutch member mounted to slide longitudinally along said stem and held against lateral movement, a spring around said stem pressing said latter clutch member against said former, a nut threading along said stem for adjusting the pressure of said spring, and an operating lever extending from said rotatable clutch member for rotating it, said rotatable clutch member engaging its cooperating member
 120 to rotate said stem for winding the motor 125 130

spring and passing by said member without affecting said stem at the termination of the winding.

6. The combination of a motor spring, of
5 a winding stem therefor, a clutch member
mounted rotatably on said stem and held
against longitudinal movement therealong, a
coöperating clutch member mounted to slide
longitudinally along said stem and held
10 against lateral movement, a spring pressing
said latter clutch member against said
former, and means to regulate the pressure
of said spring, said rotatable clutch member
engaging its coöperating member to rotate
15 said stem for winding the motor spring and
passing by said coöperating member with-
out affecting said stem at the termination of
winding.

7. The combination of a motor spring, of
20 a winding stem therefor, a clutch member

mounted rotatably on said stem and held
against longitudinal movement therealong, a
coöperating clutch member mounted to slide
longitudinally along said stem and held
against lateral movement, and a spring 25
pressing said latter clutch member against
said former, said rotatable clutch member
engaging its coöperating member to rotate
said stem for winding the motor spring and
passing by said coöperating member with- 30
out affecting said stem at the termination of
winding.

Signed at the city of New York, in the
county of New York, and State of New
York, this 26th day of June, A. D. 1915.

SAMUEL SEGAL.

Witnesses:

CHAS. W. LA RUE,
B. ROMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

The first part of the chapter discusses the importance of the study of the history of the United States. It is a subject that is often overlooked, but it is one that is essential for a full understanding of the country. The second part of the chapter discusses the importance of the study of the history of the world. It is a subject that is often overlooked, but it is one that is essential for a full understanding of the world. The third part of the chapter discusses the importance of the study of the history of the United States. It is a subject that is often overlooked, but it is one that is essential for a full understanding of the country. The fourth part of the chapter discusses the importance of the study of the history of the world. It is a subject that is often overlooked, but it is one that is essential for a full understanding of the world.

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1,173,466

WINDING INDEX FOR INDICATOR MECHANISM
FOR TIMEPIECES, MUSICAL AND OTHER
MECHANISMS,

#1,173,466-----C. Teske,
Patented-February 29, 1916.
Filed-April 18, 1914.

C. TESKE.

WINDING INDEX FOR INDICATOR MECHANISM FOR TIMEPIECES, MUSICAL AND OTHER MECHANISMS.
APPLICATION FILED APR. 18, 1914.

1,173,466.

Patented Feb. 29, 1916.

5 SHEETS—SHEET 1.

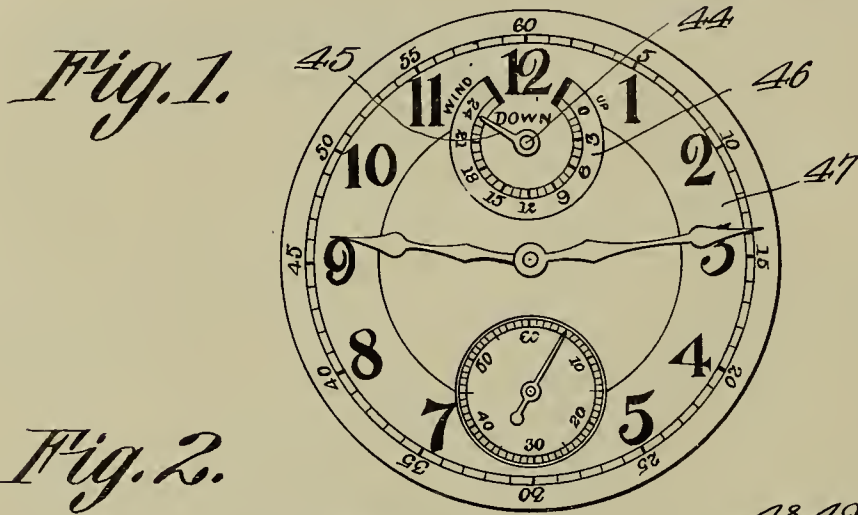


Fig. 2.

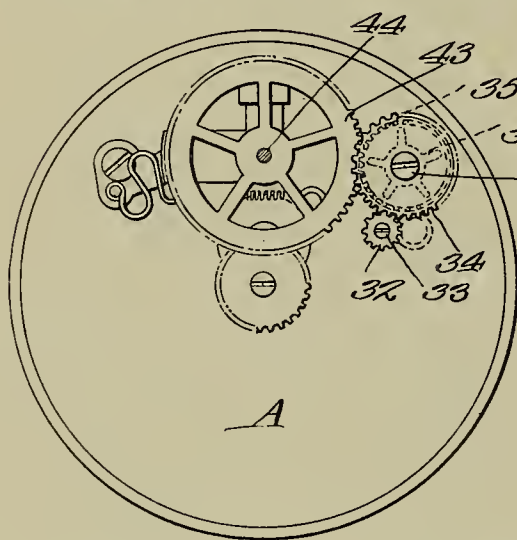
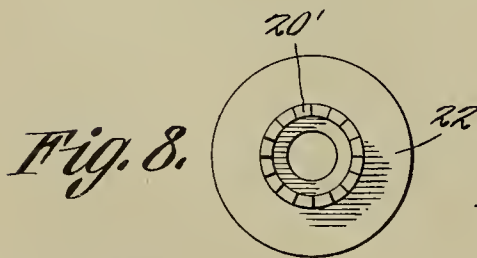
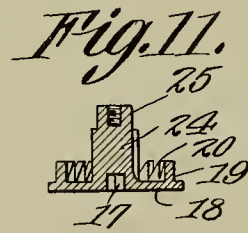
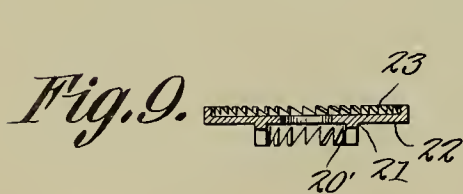
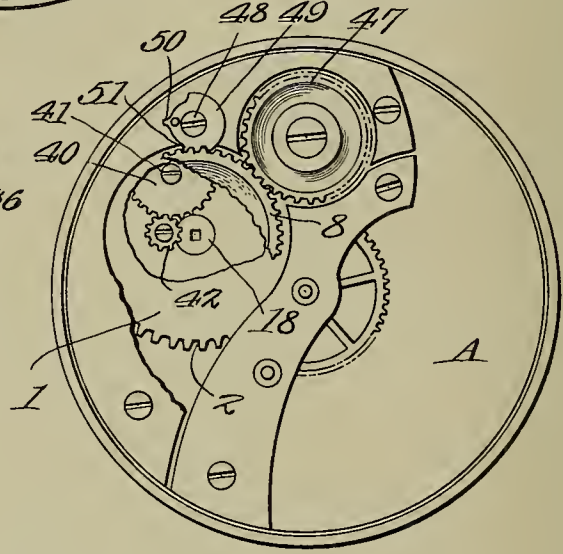


Fig. 3.



Witnesses

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WINDING INDEX FOR INDICATOR MECHANISM FOR TIMEPIECES, MUSICAL AND OTHER MECHANISMS.

APPLICATION FILED APR. 18, 1914.

1,173,466.

Patented Feb. 29, 1916.

5 SHEETS—SHEET 2.

Fig. 4.

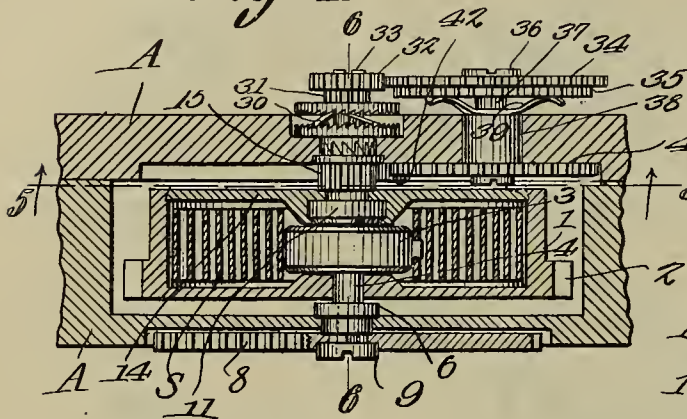


Fig. 6.

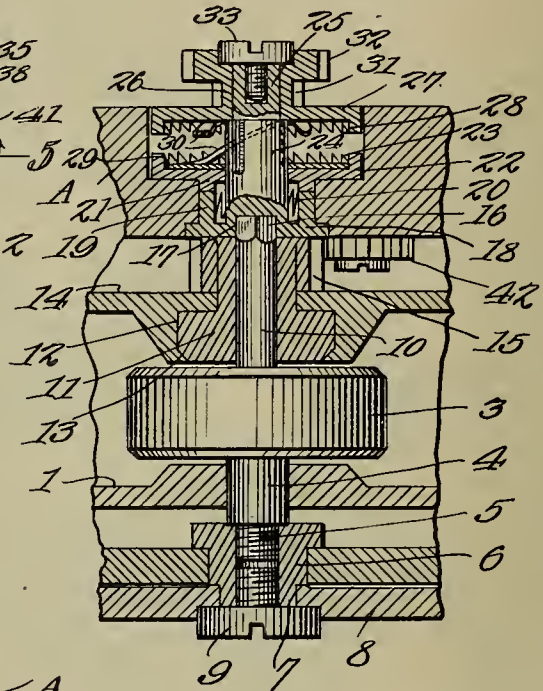


Fig. 5.

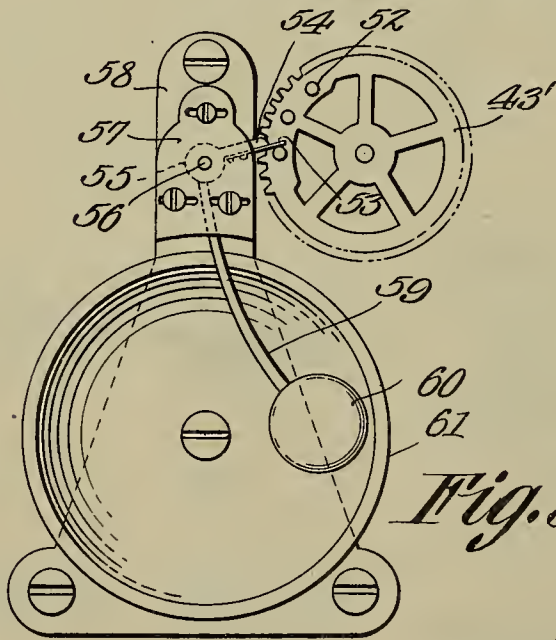
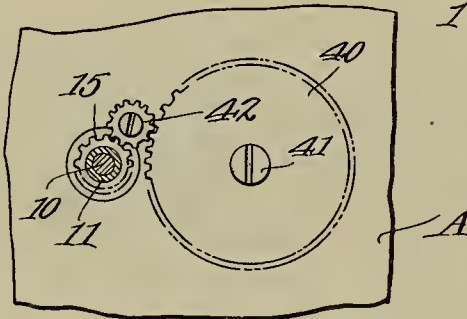


Fig. 30.

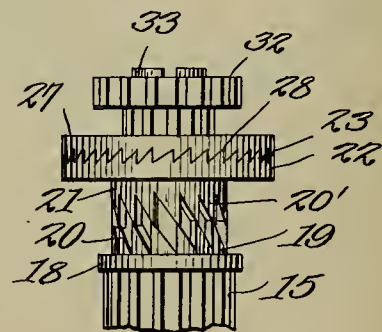


Fig. 7.

Witnesses

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1,173,466.

Patented Feb. 29, 1916.

5 SHEETS—SHEET 3.

Fig. 13.

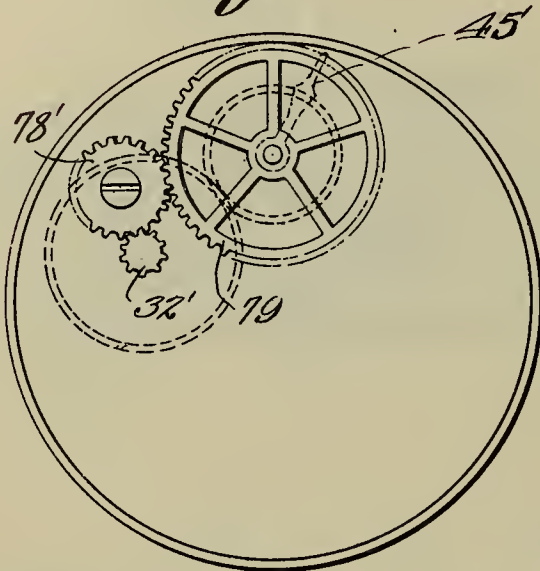


Fig. 18.

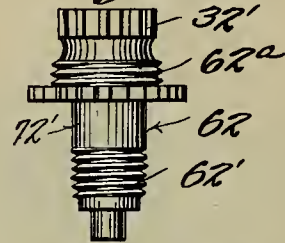


Fig. 19.

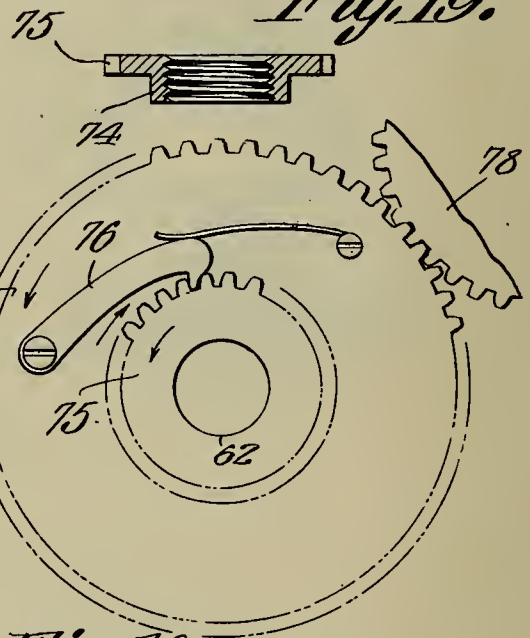


Fig. 15.

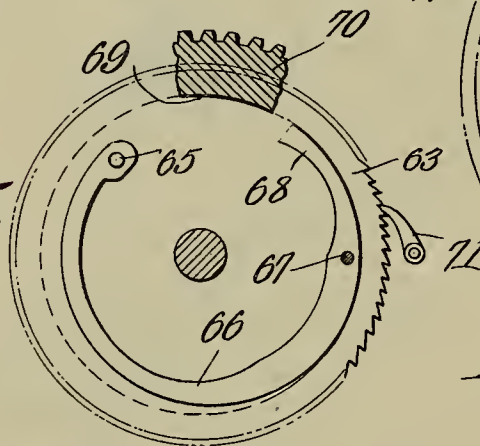


Fig. 16.

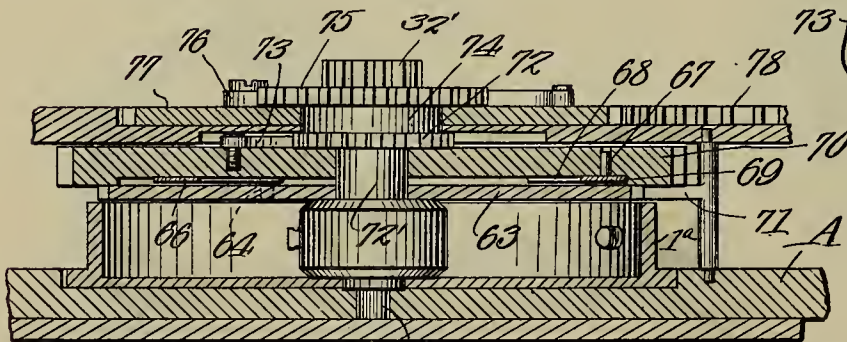
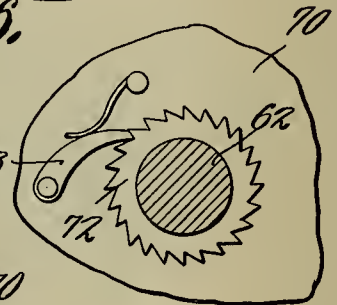


Fig. 17.

Fig. 14.

Witnesses

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Fig. 20.

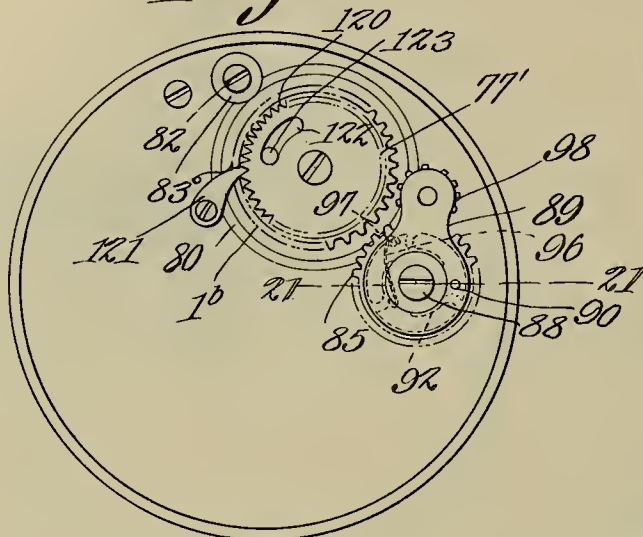


Fig. 22.



Fig. 23.

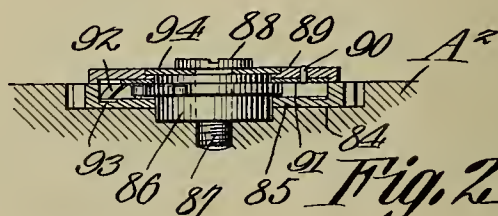


Fig. 25.

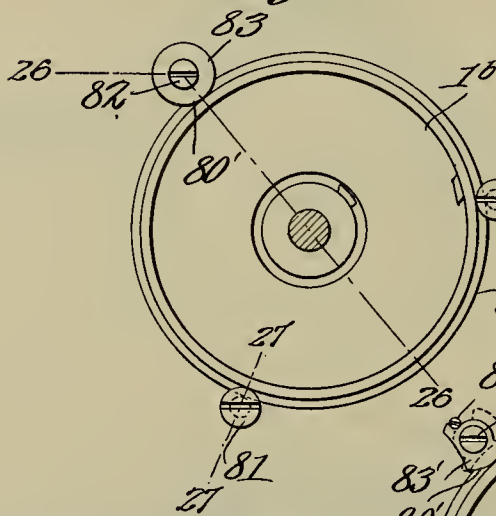


Fig. 26.

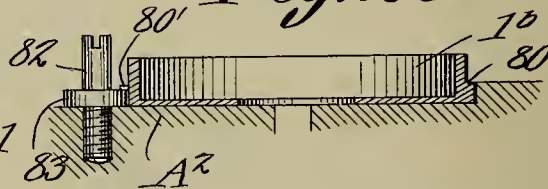


Fig. 27.

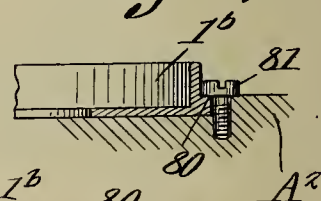


Fig. 29.

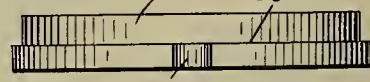
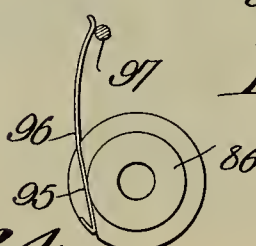


Fig. 28.

Fig. 24.

Witnesses
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WINDING INDEX FOR INDICATOR MECHANISM FOR TIMEPIECES, MUSICAL AND OTHER MECHANISMS.
APPLICATION FILED APR. 18, 1914.

1,173,466.

Patented Feb. 29, 1916.

5 SHEETS—SHEET 5.

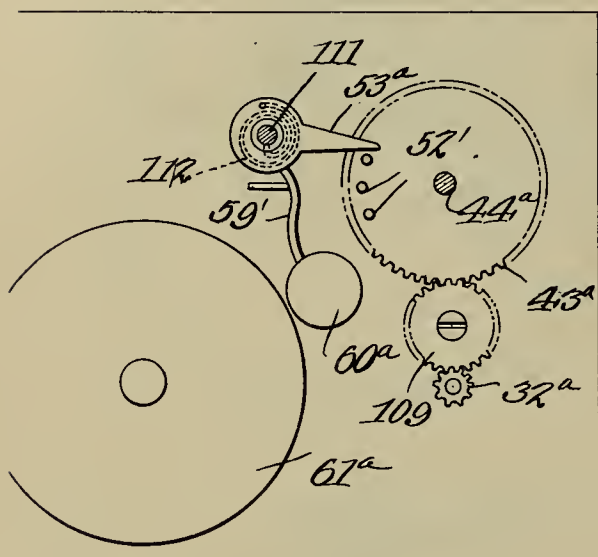


Fig. 31.

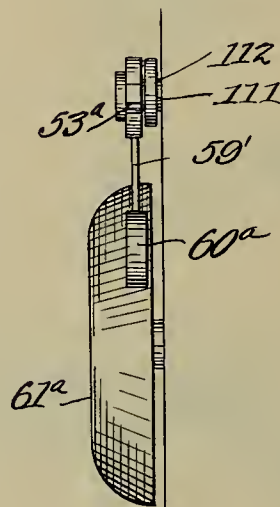


Fig. 32.

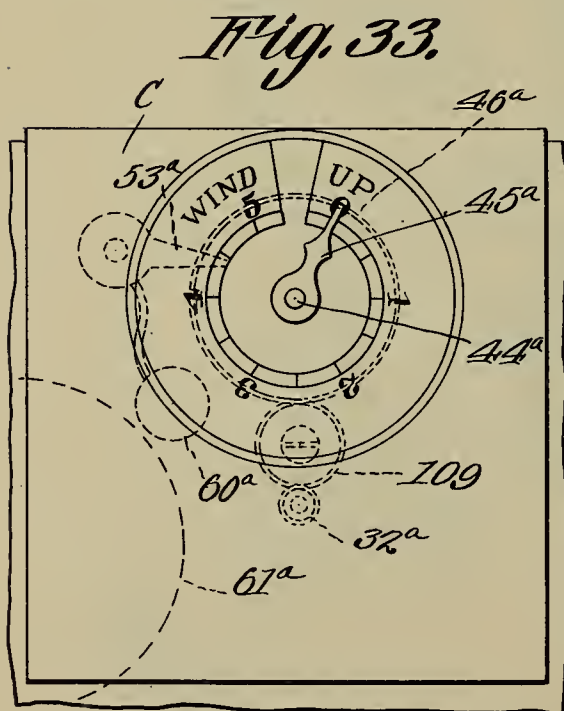


Fig. 33.

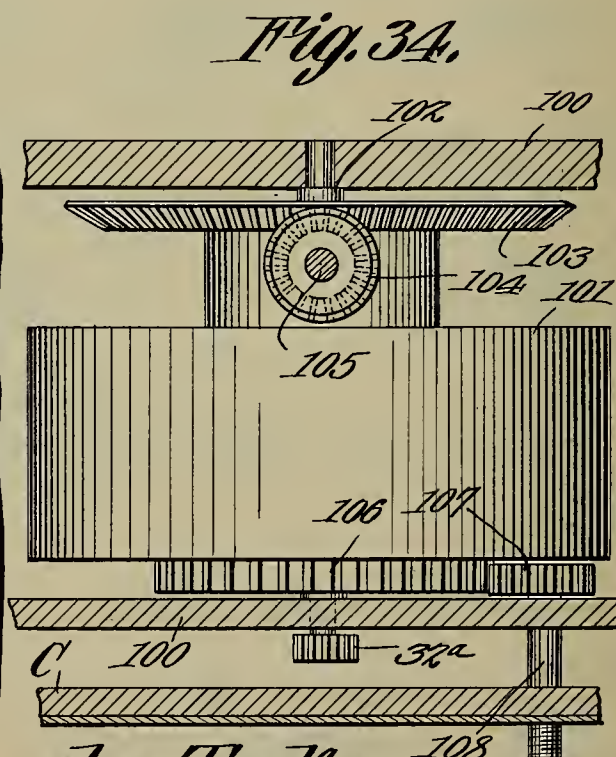


Fig. 34.

Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES TESKE, OF WILDROSE, NORTH DAKOTA.

WINDING-INDEX FOR INDICATOR MECHANISM FOR TIMEPIECES, MUSICAL AND OTHER MECHANISMS.

1,173,466.

Specification of Letters Patent.

Patented Feb. 29, 1916.

Application filed April 18, 1914. Serial No. 832,934.

To all whom it may concern:

Be it known that I, CHARLES TESKE, a citizen of the United States, residing at Wildrose, in the county of Williams and State of North Dakota, have invented a new and useful Winding-Index for Indicator Mechanism for Timepieces, Musical and other Mechanisms, of which the following is a specification.

The present invention relates to a winding index or indicator mechanism, and especially to a winding mechanism for time movements in watches, clocks or other power driven mechanism in which the movement of the driven members are imparted by force stored up in a previously wound spring cord or other winding device.

The principal feature of this invention is the provision of an improved device for watches, clocks and time movements to indicate by a dial and hand, or by an audible signal, the limit of winding, and also the limit of unwinding, such indicator indicating the number of hours the mechanism has been running after the same has been fully wound so that the same may be rewound before it has fully unwound, thus permitting the motor to be wound before the full stoppage thereof, especially of watches or clocks, whereby the accurate time would not only be lost, but a variation would take place on these otherwise accurate time pieces due to the tendency of the main spring growing perceptibly weaker as it runs down, especially after it has run twenty-four hours, subsequent to its having been fully wound.

This invention is especially designed to make the present high grade watches which run with a variation of but a few seconds per week or month, more serviceable, as such close time pieces by placing before the owners, an index consisting of a pointer or hand in connection with a dial having figures thereon, from 1 to 24, whereby they can at a glance observe whether the watch has been wound or not at the proper time, that is exactly twenty-four hours after its winding, the index consisting of a special dial and hand, is a constant silent reminder of what has been done in reference to the winding of the time piece and as to what should be done to prevent the time piece from running down, which in exceedingly accurate time pieces is undesirable for the reason that af-

ter a fine regulation of such time piece and a subsequent stoppage thereof, or the irregular winding thereof a re-regulation would be necessary.

It is therefore the object of the present invention to provide a winding index or indicator mechanism which is applicable to any of the high grade watches now made, and which will indicate at a glance the relative condition of the spring of such time piece.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings:—Figure 1 is a front view of the dial of a watch showing the position of the visual indicator of the present invention. Fig. 2 is a front view with the dial removed, the winding indicator mechanism being here shown as operably connected to an Illinois Watch Company pendant stem winding watch. Fig. 3 is a view in elevation and partly in section of the same watch taken from the main plate and center bridge side thereof, with the spring or winding wheel shown in section. Fig. 4 is a cross sectional view through the main spring barrel, and the adjacent mechanism for operating the indicator hand of the present winding index. Fig. 5 is a section taken on line 5—5 of Fig. 4. Fig. 6 is an enlarged view taken on line 6—6 of Fig. 4. Fig. 7 is an enlarged detail view of the clutches employed in connection with the present winding index. Figs. 8, 9, 10, 11 and 12 are detail views of various parts of the clutch. Fig. 13 is a plan view partly in section showing a modified form of operating means for winding index especially adapted for use in connection with an arbor and driven spring. Fig. 14 is a cross section through the spring casing and the adjacent mechanism of the device as shown in Fig. 13. Fig. 15 is a bottom plan view of the connection between the arbor and the time train mechanism, whereby the time train mechanism is not impeded during the winding of the spring. Fig. 16 is a detail

plan view of the pinion actuated wheel whereby the spring arbor is wound. Fig. 17 is a plan view of a small ratchet wheel and pawl connected adjacent to the winding wheel of the arbor. Figs. 18 and 19 are detail views of the arbor and the ratchet wheel carried thereby. Fig. 20 is an enlarged detail view showing one method of connecting and disconnecting the winding pinion for winding the arbor. Fig. 21 is a cross section taken on line 21—21 of Fig. 20. Figs. 22, 23 and 24 are detail views of the various parts of the winding pinion connecting mechanism. Fig. 25 is a top plan view of the spring casing showing the method of locking the same in the watch movement. Fig. 26 is a section taken on line 26—26 of Fig. 25. Fig. 27 is a section taken on the line 27—27 of Fig. 25. Fig. 28 is a side elevation of the spring casing showing the locking recess therein. Fig. 29 is an enlarged detail view showing a modified form of locking mechanism for the spring casing. Fig. 30 is a detail plan view showing the form of mechanism used in connection with an audible alarm. Fig. 31 is a plan view showing the present winding index as applied to a sound reproducing machine. Fig. 32 is a side elevation showing the bell striker and bell of the mechanism shown in Fig. 31. Fig. 33 is a plan view of the dial, dotted lines illustrating the position of the parts as shown in Fig. 31. Fig. 34 is a top elevation partially in section showing a sound reproducing machine motor and the relative position of the pinion for operating the winding index.

Referring to the drawings, A designates the frame for supporting the works of the present movement, there being mounted therein, the main spring barrel 1 having the peripheral teeth 2 of usual structure, the cylindrical enlargement 3, which is carried by the spindle or shaft 4 being disposed within the barrel and having connected thereto one terminal of the main spring S, while the other terminal is connected to the barrel 1. The lower end of the spindle 4 is threaded as at 5 into the bushing 6 which is mounted in the frame of the watch movement, the further reduced end 7 of the bushing 6 being of irregular shape for the reception of the winding wheel 8, the screw 9 being employed for holding the winding wheel 8 in proper relation. Thus movement is imparted to the spindle 4 and the spring is wound as the winding wheel 8 is rotated. A bushing 11 surrounds the upper reduced end 10 of the spindle 4 so that said spindle will rotate freely therein, the enlarged end 12 of the bushing 11 being seated within the cup 13 formed in the under side of the plate 14, said bushing being of a hard metal while the plate 14 is of a softer metal, so that a hard bearing is produced for the reduced

end 10 of the spindle 4. The mouth of the socket 13 is spun inwardly so as to lock the bushing 11 rigidly to the plate 14. Connected fixedly to the rigidly reduced end of the bushing 11 exteriorly of the plate 14, is a gear 15, the purpose of which will presently appear. The upper end of the reduced spindle 10 is squared as at 16 and is insertible within the square socket 17 of the spindle 24. This spindle 24 at one end where it is set into the main plate of the movement is flanged as at 18 and is provided with the sleeve 19 having the cam teeth 20. A sleeve 21 is mounted freely for rotation upon the shaft 24 within the oppositely disposed recessed portion of the movement frame and is provided with cam teeth 20' for coaction with the cam teeth 20 so that the member 19 will be secured to rotate the member 22. The member 22 is provided with an upstanding toothed rim 23, which constitutes a clutch member, that is elevated, due to the rotation of the member 4 and the consequent sliding of the clutch teeth 20 upon the teeth 20' to properly operate the clutch as will presently appear. The stud or stem 24 is provided with the reduced end 25, upon which is mounted the member 26, said member 26 being provided with a disk 27 having the clutch teeth 28 for coaction with the teeth 23 of the member 22, there being interposed between the members a plate 29 provided with a plurality of resilient or spring arms 30 which bear against the under side of the plate 27 to hold the member 22 downwardly with the teeth 23 normally out of engagement with the teeth 28. Thus as the winding barrel or member 3 is operated to wind the spring, the stem 10 will operate the spindle 24 and as the member 18 is also rotated therewith, the teeth 20 will ride under the teeth 20' elevating the plate 22 so that the teeth 23 are placed in engagement with the teeth 28 of the clutch member 27, thus causing the clutch member 27 to rotate with the clutch member 22 and rotate the reduced pinion 31 and the enlarged pinion 32 both of which are secured to and rotate with the clutch member 27. A screw 33 is mounted to hold the upper clutch member 27 fixedly upon the reduced end 25 of the stem or spindle 24.

The reduced end 37 of the shaft 38, which is journaled in the frame of the watch movement has attached thereto, for independent rotation, the two gears 34 and 35 which bear together frictionally, a screw 36 acting as a limiting means to hold the said gears 34 and 35 against displacement, while the spring member 39 which has a plurality of arms, engages the stem or shaft 38 and the under side of the gear 35 so that the gears 35 and 34 will rotate with the stem 38. The friction between the contacting faces of the gears 34 and 35 will naturally be greater

than that between the gear 35 and spring 39, so that the gear 35 will tend to turn with the gear 34.

A gear 41 is attached to the other end of the stem or shaft 38, and is in mesh at all times with the intermediate pinion 42 which is in mesh with the pinion 15, the purpose of which will presently appear.

Meshing at all times to be driven by the gear 35 is a gear 43, which is attached to the arbor 44 projected through the dial 47 and carries the indicating hand 45. This indicating hand is disposed to point to the various digits of the winding indicator dial 46 which is printed or formed upon the dial 47, as clearly shown in Fig. 1.

It will thus be seen that when the winding wheel 8 is operated to rotate the spindle 4, that the hand 44 will be moved from 24 toward O or in the opposite direction to that indicated in Fig. 1. the release of the winding action permitting the springs 30 to depress the clutch member 22 so that the main spring action upon the barrel 1 will rotate the gear 15 and through the gears 42 and 40 rotate the spindle or shaft 38, such action operating the gear 35 to move the gear 43 in such direction as to move the hand 45 toward the word "wind" or the numeral 24. As the gear 32 and the upper clutch member 27 is free to rotate upon the reduced end 25 of the stem 24, the gear 34 at this time will rotate such members without undue friction upon the remaining train.

In order to provide a means to prevent the too far winding of the main spring, the gear 8 being turned from the winding gear 47, a screw 48 is employed to secure the mutilated gear 49 in place, said gear being provided with one tooth 50 and with a plurality of teeth 51, which constitute a "click" to let down the spring and thus assist in preventing the too far winding of the spring through the gear 8.

In Figs. 13 through 29, are illustrated types of watches in which the spring case is held fixedly and the arbor is operated to wind the spring and to also impart movement to the time train of the watch.

As illustrated in Fig. 14, the casing 1^a is seated and locked within the frame plate A', the winding and operating arbor 62 being disposed as usual and connected to the spring (not shown). Mounted for rotation about the arbor upon the cylindrical portion 72' thereof, is a gear 63, and this gear is provided with a recess 64 in which fits the pin 65 carried in the free end of the maintaining spring 66, said spring 66 being connected by a pin 67 in the recess 69 of the ratchet wheel 70 and so disposed as to be put under tension when the wheel 63 is engaged by the pawl 71, during the winding of the main spring, thus preventing the

stoppage of the time train during the winding of the spring. In order that the gear 70 may be driven from the arbor 62, a ratchet wheel 72 is engaged by the spring actuated pawl 73 carried by the gear 70, the winding of the arbor 62 causing the ratchet 72 to rotate without imparting motion to the gear 70, the pawl 73 being active only when the arbor 62 is operated by the spring to in turn operate the watch movement.

In order to provide a means whereby the spring is wound, the gear 77 is mounted for free rotation upon the cylindrical portion 74 and is set down into the frame of the watch so as to be engaged by the gear 78, which in turn is operated by the usual pinion. The gear 75 is fixed upon the arbor 62 and is adapted to be engaged by the spring actuated pawl 76 carried by the gear 77 when the gear 78 is operated to wind the spring, the pawl 76 when the arbor 62 is operated by the spring, being moved in an opposite direction does not connect the gear 75 to the gear 77 and thus the gear 75 is stationary.

Carried upon the free end of the arbor 62 is the small pinion 32' which corresponds to the gear 32 heretofore described, the same in this instance being in mesh with the gear 78' and through this gear operating the gear 79 and consequently the pointer or indicator 45' of the winding index. It will thus be seen that as the arbor 62 is moved to wind the spring, that the pinion 32' will be moved in a direction to move the pointer 45' to indicate that the spring is being wound while when the arbor 62 is being operated by the wound spring, the gear 32' will be operated and moved in the opposite direction, to thus move the indicator 45' in the opposite direction and to indicate that the spring is unwinding.

The spring carrying casing 1^b, as illustrated in Figs. 20 through 29, is provided with a peripheral rim 80 which is recessed as at 80' and such casing is adapted to be seated within the recess in the casing or frame A² and be held therein by means of the screw 81, the screw 82 having fixed thereon the disk 83, so that the disk 83 may be moved into and out of the recess 80' constituting a lock to hold the casing 1^b against rotation and consequently against the tension of the spring mounted therein when the same is wound.

In Fig. 29 in lieu of the disk 83 carried by the screw 82, a cam 83' mounted upon a screw 82' and limited in its movement by the pin 84, is provided.

In both these instances, when it is desired to let the spring down, it is merely necessary to raise the disk 83 to rotate the screw 82 until the disk is out of the recess 80', at which time the casing 1^b will be rotated under the tension of the spring until the

same runs down. When the cam 83' is used it is merely necessary to swing the cam to the dotted line position as shown in Fig. 29 at which time the casing 1^b is released to permit the free unwinding of the spring. By this means, the spring casings of this character are readily let down, in an exceedingly simple and effective manner.

In the form as particularly illustrated in Figs. 20 through 24, a novel mechanism for winding the arbor is provided, it comprising primarily, the gear 85 apertured to rotate freely upon the shoulder 86, which is disposed upon the screw 87 and held fixedly within the frame A² thereby. The yoke 89 is mounted for oscillation and properly held in place by means of the washer 94 and the head 88 of the screw 87.

A pin 90 is an attaching means for holding the spring washer 91 to the under side of the yoke 89, above the recessed portion of the gear 85, the spring terminals 92 of the washer 91 being disposed to engage the corrugated portion 93 of the gear 85 so that when the gear 85 is operated through the stem winding pinion (not shown), sufficient friction will be provided between the gear 85 and the yoke 89 to swing the yoke so that the gear 98 will be placed in mesh with the gear 77' so that the winding arbor of the spring will be properly wound. In order to provide an automatic release to move the yoke 89 so that the gear 98 will be placed out of mesh with the gear 77', the spring 96 which is fitted in the recess 95 of the member 86 is provided, the free end thereof engaging the pin 97 secured to and carried by the under side of the yoke 89.

It will thus be seen that with the present form of winding index, that the same is readily applicable to both the spring mechanisms in which the casing and arbor are actuated by a spring or actuated to wind the spring, and where the arbor only is operated to wind the spring and to in turn drive the time train.

Although the present mechanisms heretofore described have been shown as applied to time pieces, it is evident that the same may be applied to indicate the condition of the springs of other types of motors, and as particularly illustrated in Figs. 30 through 34 as applied to the spring motor of a sound reproducing machine.

As shown in Fig. 30, the wheel 43' which is similar to the wheel 43 heretofore described, is provided with a plurality of pins 52, which are disposed in the path to engage a finger arm 53 supported upon the member 54. This member 54 is provided with the spindle 55 which is mounted upon the pin 56 between the two plates 57 and 58. A rod 59 carries a clapper or hammer 60, which is connected to the spindle 55 so that when the arm 53 is released after engaging one of the

pins 52, the clapper 60 will engage the bell 61 and operate the same to indicate that the spring motor needs rewinding.

In the construction shown in Figs. 31 through 34, the sound reproducing machine frame 100, has mounted therein, the spring motor casing 101, and the casing 101 is mounted to operate the bevel gear 103 and through it the small bevel pinion 104 and its shaft 105 which is connected as is usual to the record carrier or platform (not shown). The gear 106 is the gear for operating the arbor 102 and the same is operated by the gear or pinion 107 carried by the winding stem 108. A pinion 32^a which corresponds with the pinion 32 heretofore described, is carried upon the outer end of the arbor 102, and meshes with the pinion 109 which in turn meshes with the gear 43^a and consequently operates the arbor 44^a and the indicator 45^a so as to indicate the condition of the spring through the dial 46^a carried by the casing C. Carried upon the face of the gear 43^a, are a plurality of pins 52' which are disposed in the path to engage the trigger arm 53^a.

The trigger 53^a is mounted for rotation upon the stem or shaft 111 for free movement while the spring 112 is connected to the arm 52^a and to the spindle or shaft 111, so as to provide a resilient connection therebetween for imparting the necessary movement to the rod 59' and the hammer or clapper 60^a so that the bell or audible alarm 61^a may be struck at the proper time.

While the respective dials and audible alarms 61 and 61^a are shown, it is evident that electrical contacts may be used whereby a circuit is closed to energize an alarm at a distant point, and that such alarm may constitute either an audible or visual one to indicate that the spring needs rewinding.

As shown in Fig. 20, the ratchet wheel 120 superposes the gear 77', a pawl 121, being disposed to engage the same so that when the gear 77' is operated to wind the spring, the pin 123 will move to the opposite end of the arcuate slot 122 of the wheel 120 before the spring will be started, this means preventing a too far winding of the main spring, and as now particularly set forth in my U. S. Letters Patent No. 607,144 granted to me July 12, 1898.

What is claimed is:

1. The combination with a spring motor, and means for winding the spring thereof, of an indicator mechanism for the condition of the spring connected for movement in one direction during the winding of the spring and for movement in the other direction during the unwinding of the spring, such indicating mechanism, including a gear connected to the driving portion of the spring, a clutch connected to the winding portion of the spring, a shaft, a gear con-

5 nected to one end thereof and in mesh with
the first mentioned gear, two gears mounted
freely on the other end of said shaft, a re-
sili- 5 ent means for connecting the last two
gears to the shaft, whereby the gears are
permitted to rotate with the shaft when the
gear is operated by the spring, a gear con-
trolled by the clutch for operating the two
gears, and a hand carrying gear operated
10 by one of the last two gears, whereby when
the spring is being wound, the latter gear
is moved in one direction and is moved in
the opposite direction when the spring is
unwinding.

15 2. The combination with a main spring
and barrel, and means for winding the same,
of an indicator for the main spring, includ-
ing a normally open clutch, means connected
to the winding arbor for closing the clutch
20 as the spring is being wound, a shaft, co-
operable means carried by the barrel and
shaft, whereby the shaft is rotated as the
spring is unwinding, a hand carrying arbor,
means carried by the shaft and connected to
25 the clutch, whereby motion in two direc-
tions is imparted to the hand carrying arbor,
said last means including two gears freely
rotatable upon the shaft, one of said gears
being engageable with the clutch, and the
30 other with the hand carrying arbor, and a
spring interposed between the gears and
shaft for holding the gears fixed to the shaft
when the arbor is being operated by the
winding barrel.

35 3. The combination with a spindle, and
a barrel rotatable thereon, of a pointer op-
erating gear, a second gear meshing with
the said gear and journaled for rotation upon
said spindle, the second gear having a clutch
40 member, a second clutch member feathered

upon the spindle and coöperating with the
first mentioned clutch member, spring means
for separating said clutch members, cam
means for moving the second clutch mem- 45
ber into engagement with the first men-
tioned clutch member when the spindle is
rotated, a shaft operatively connected to the
barrel, the first mentioned gear being mount-
ed for rotation upon said shaft, and fric- 50
tion means between said shaft and first men-
tioned gear tending to cause them to rotate
together.

4. In a mechanism of the character de-
scribed, a spring winding member, a spring
actuated member, a pointer an- operative 55
connection between the pointer and one of
said members including a normally open
clutch, and means for closing said clutch
when said member is rotated, and means op-
erated by the other member for actuating 60
the pointer when the clutch is open.

5. In a mechanism of the character de-
scribed, a spring winding member, a spring
actuated member, a pointer, an operative 65
connection between the pointer and one of
said members including a normally open
clutch, and means for closing the clutch
when said member is rotated, and an op-
erative connection between the pointer and
other member including friction means per- 70
mitting of slippage when the clutch is
closed.

In testimony that I claim the foregoing
as my own, I have hereto affixed my signa-
ture in the presence of two witnesses.

CHARLES TESKE.

Witnesses:

ANDREW CHRESH,
J. A. PETERSON.

GRAPHOPHONE PATENT.

SOUND REPRODUCER,
1,173,501-----E. S. GEER,
Patented-February 29th, 1916.
Filed-March 25th, 1914.

E. S. GEER.
SOUND REPRODUCER.
APPLICATION FILED MAR. 25, 1914.

1,173,501.

Patented Feb. 29, 1916.

Fig. 1.

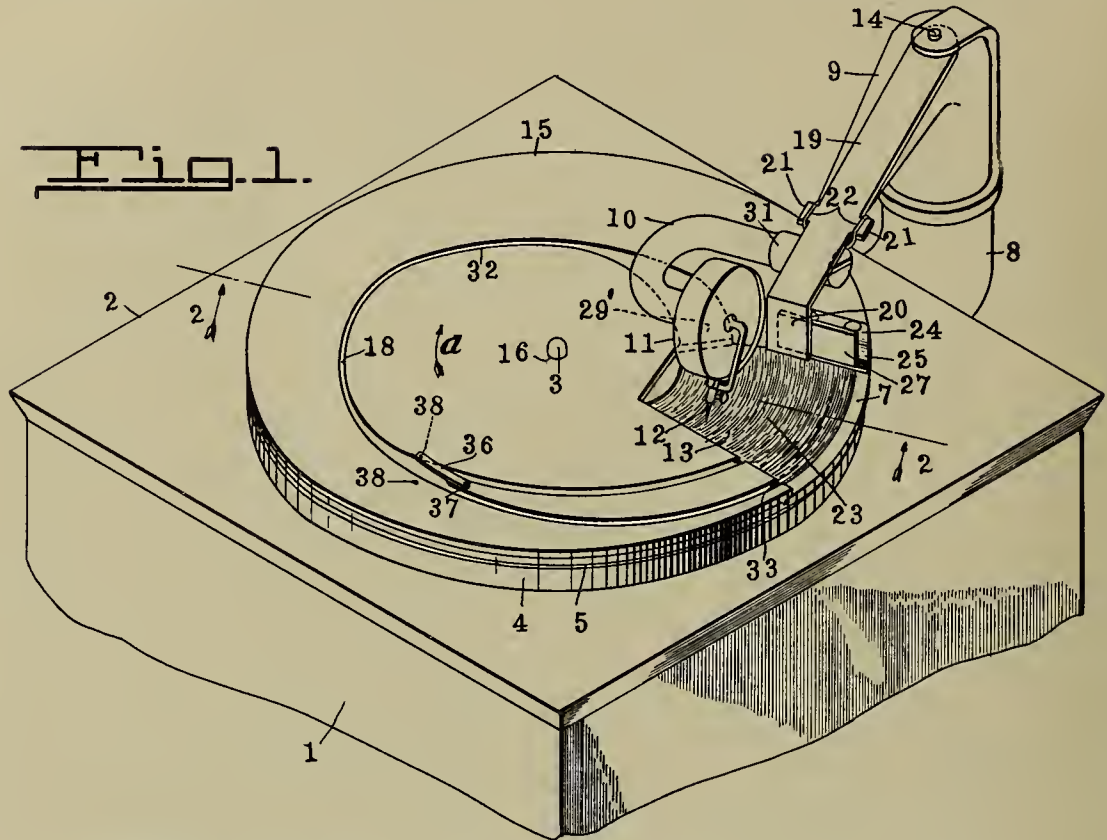


Fig. 2.

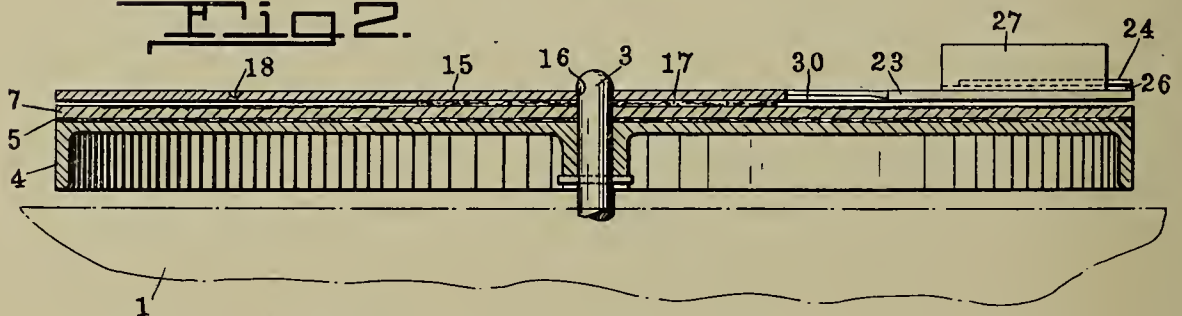
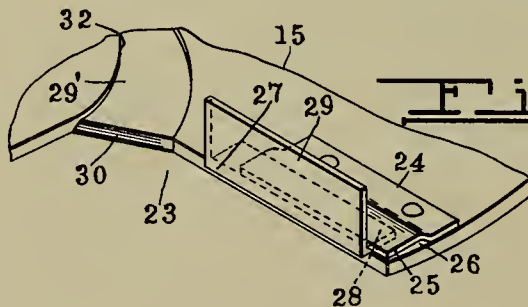


Fig. 3.



WITNESSES:

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INVENTOR

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BY

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UNITED STATES PATENT OFFICE.

EDMUND S. GEER, OF NEW YORK, N. Y.

SOUND-REPRODUCER.

1,173,501.

Specification of Letters Patent.

Patented Feb. 29, 1916.

Application filed March 25, 1914. Serial No. 827,239.

To all whom it may concern:

Be it known that I, EDMUND S. GEER, a citizen of the United States, residing at New York city, in the county of Bronx and State of New York, have invented certain new and useful Improvements in Sound-Reproducers, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to sound reproducing apparatus, and with respect to certain more specific features thereof, to so-called repeating means therefor.

The invention has for one of its objects to provide a simple and practical device of the character above referred to.

Another object of this invention is to provide a device which will automatically and rapidly restore the reproducer needle or stylus to initial position on a sound reproducing record to cause the latter to be replayed.

Another object of this invention is the provision of light and durable mechanism for accomplishing the preceding object.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, wherein is shown one of various possible embodiments of this invention, Figure 1 is a view in perspective of a sound reproducing machine embodying this invention; Fig. 2 is a vertical sectional view taken approximately on the line 2—2 of Fig. 1; and Fig. 3 is a view in perspective of certain details of the invention.

Referring now more particularly to the drawings, wherein similar reference characters refer to similar parts throughout the several views, there is indicated at 1 a usual type or box or housing adapted to confine certain working parts of a graphophone, such as the spring motor and associated mechanism. This housing 1 has a top 2, preferably horizontal and recessed to permit a stud 3, connected with the spring motor (not shown), to project therethrough. Fixed to the stud 3 is the usual turntable 4,

provided on its upper surface with a covering of felt or other frictional material 5. The stud 3 continues upwardly and through the table 4 and the covering 5 and projects for a short distance thereabove.

A record member, in the present instance a disk record is indicated at 7 (best shown in Fig. 2), and is mounted loosely over the stud 3, which holds it against radial displacement of the table and is adapted to be carried on said table by reason of the friction created by the covering 5 contacting with the under side of the disk 7.

Upon a bracket 8, projecting from the housing 1, there is pivotally supported a long arm 9, carrying at its free end a pivoted curved arm or gooseneck 10, which in turn carries the sound reproducing member 11 and its needle 12. In the playing operation the rotation of the disk 7 in the direction of the arrow *a* causes the needle 12 to follow in the record, in the present instance, embodied in a minute spiral groove 13 of the reproducing portion of the disk, and, accordingly, at each revolution of the disk the needle 12 is moved or transported slightly, although almost imperceptibly, about the pivot 14 transversely of the record member. This movement continues to the end of the spiral groove 13.

A returning plate 15, preferably of hard rubber or a similar material and of the general peripheral shape of the disk 7, is provided with a central aperture 16, similar to the aperture in the disk, in order to permit the plate 15 to be placed over said disk centering about the pin or stud 3. This plate is preferably provided on its under surface with a contacting disk or washer 17 of soft frictional material.

The upper side of the plate 15 is provided with a cam 18, preferably in the form of an eccentric or spiral groove.

In order to control the operation of the cam, an escapement is employed, one member of the escapement being carried by the reproducer arm and another by the cam or cam plate. Secured to the upper side of the arm 9 is one member of the escapement, as a pawl comprising a flat elongated strip 19, having a down turned forward free end 20 and oppositely disposed ears 21. A band of elastic material 22 is adapted to be passed from one of the ears 21 around the arm 9 and connected with the opposite ear 21, in

order to provide a slightly yielding relation between the strip 19, which is pivoted at 14, and the arm 9 which is also pivoted at 14. The plate 15 is recessed as at 23 to permit the needle 12 to contact with the record on the disk 7 and enjoy the substantially radial movement hereinbefore described.

Secured to the plate 15 on the outer portion thereof, adjacent the opening 23, is a bracket 24, comprising a struck-up portion 25, extending a short distance away from the upper surface of the plate 15, the same providing a slot 26 between said plate and said portion 25, which serves to guide the other member of the escapement, this latter comprising an angle member 27, one wall 28 of which plays within the slot 26 and the other wall 29 of which projects upwardly to coact with the down turned portion 20 of the strip 19. The bracket 24 is preferably of some spring or resilient material and is adapted to exert a slight pressure by means of the struck-up portion 25 against the wall 28 of angle member 27, serving in a measure to frictionally hold the angle member 27 relatively to said bracket.

It will be obvious that the angle member may have a range of longitudinal movement within the slot 26, and accordingly may be adjusted therein to occupy different positions relative to the plate 15 and the same will be substantially secured where adjusted by the friction means previously explained. The movement of the angle member 27 in the slot 26 is radial. The spiral cam groove 18 is preferably narrow for a considerable portion of its length, but one end of said groove is preferably flared, as indicated at 29'. A bevel or cam portion 30 extends from the end of the flared portion 29' to one edge of the recessed portion 23 of the plate.

In the operation of this device the disk 7 is placed upon the table 4, with the stud 3 projecting thereabove. The plate 15 is then placed over the stud 3 with the friction disk or washer 17 bearing against the upper side of the disk on an unscored portion thereof. The recess 23 is properly positioned relatively to the path of travel of the needle 12. The arm 9 is then swung about the pivot 14 into position to bring the needle or stylus 12 opposite the beginning of the scored or spirally grooved portion of the disk. At the same time the down turned portion 20 of the strip 19 may be brought into position to contact with the angle member 27 at the outer portion of the latter, and this down turned portion 20 will remain in contact during the sound reproducing operation of the device. As the needle or stylus 12 is moved inwardly toward the stud 3 the member 20 will slide along the wall 29 of the angle member 27, which has been previously adjusted to set the adjustment to permit the member 20 to pass out of contact with the

angle member 27 at the precise point where the sound reproducing operation ends. It will be noted, therefore, that as the table 4 turns, carrying with it the disk 7, the plate 15 is held against rotary movement in the playing direction (indicated by the arrow *a*), by reason of the downturned member 20 hooking over the angle member 27. Immediately, however, the downturned member 20 passes longitudinally out of contact with the angle member 27, the plate 15 is free to rotate with the disk 7 on the table 4 and the same is caused so to rotate by reason of the frictional engagement of said plate with the disk 7 through the medium of the friction disk 17. When the plate 15 commences to rotate with the disk 7, the bevel 30 of the plate is brought against the needle 12, and it is to be noted that said needle, as is usual in machines of this character, occupies a slightly oblique position, providing improved sound reproduction. The gooseneck 10 has a pivotal movement, as indicated at 31, and when the bevel 30 is brought into contact with the needle, subsequent movement of the plate in the direction of the arrow *a* causes the portion of the sound reproducing means comprising the needle and sound box to yield about the pivot 31 and the needle to move up into the flared portion 29 of the groove 18. The inner wall 32 of this spiral groove 18 operates as the plate 15 continues to rotate, to urge the needle 12 and all the associated mechanism, including the downturned flange 20, back to initial position. To secure the best results in returning the needle to initial playing position, it is desirable to urge the same gradually toward said position, and for this reason the cam groove 18 extends for a considerable distance around the plate 15 to a point where, by means of a bevel or incline 33, the needle is permitted to ease down upon the disk 7, it being understood of course that at this time the needle has been returned to its primary position. Further continued movement of the plate 15 brings the angle member 27 again in contact with the downturned member 20 of the strip 19 and prohibits further rotation of the plate 15 with the disk. The needle having been returned into the spiral groove 13 of the disk is now in position to replay the selection and the aforesaid operation may be successfully repeated and is determinable only upon the failure of the motive power. In order to prevent the needle from becoming defaced, the plate 15 is preferably of some undeleterious material such, for example, as is used in the disk 7, more particularly, perhaps, a composition, with rubber as a prominent element. If desired, instead of employing the washer or disk 17, a cap of frictional material might be formed in the aperture 16, and contacting with the stud 3

would have the effect of causing the plate 15 to rotate with the table 4 and the disk 7 when the member 20 passed out of contact with the angle member 27. This would maintain the plate 15 out of contact with the disk 7 and avoid the possibility of retarding or stopping the disk because of the friction between the disk and the plate. It is, however, merely a question of degree to regulate the friction between the disk 7 and the plate 15 so that it will not be sufficient to overcome the friction exerted between the disk 7 and the table 4 and so that it will be sufficient to cause the plate to rotate with the disk when said plate is released after the playing operation.

Records used in different machines vary in respective sizes and switch means are provided on the plate 15 as indicated in Fig. 1 of the drawings which may be set to guide the needle into one of a plurality of different paths to return the same to the proper starting place on records of different sizes. As shown in Fig. 1 of the drawings, the switch mechanism comprises a member 36 pivotally mounted at 37 on the plate 15 and provided with a slight struck-up portion adapted to cooperate with projections 38 on the cam plate to cause said member to retain its adjusted position.

It will be obvious from the foregoing description that a device is provided which is extremely simple, which by a simple manipulation and adjustment of parts may be employed to cause repeating of records of various lengths, which is adapted to be applied to graphophones or sound reproducing devices of a standard character, and which accomplishes, among others, all of the objects and advantages hereinbefore set forth.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a repeating device for phonographs, or the like, in combination, a rotatable table adapted to support a record, a transportable reproducer needle adapted to engage a record on said table, and a cam frictionally

connected so as to rotate with said table and adapted to automatically disengage said needle and record, move said needle toward the preceding part of said record and permit reengagement of said needle and record at a preceding part of said record.

2. In a repeating device for phonographs, or the like, in combination, a rotatable table adapted to support a record, a transportable reproducer needle adapted to engage a record on said table, and a cam frictionally connected so as to rotate with said table and adapted to automatically disengage said needle and record and move said needle toward the preceding part of said record, said cam having an incline adapted to permit said needle to reengage the record at a preceding part of said record.

3. In a repeating device for phonographs, or the like, in combination, a rotatable table adapted to support a record, a transportable reproducer needle adapted to engage a record on said table, and a cam rotatable with said table adapted to automatically disengage said needle and record, move said needle toward the preceding part of said record and permit reengagement of said needle and record at a preceding part of said record, and manual means adapted to vary the path of movement of said needle under the influence of said cam.

4. In an apparatus of the character described, in combination, a record member, a needle adapted to engage the record of said member, means adapted to cause relative rotatable movement between said record member and said needle to play the record comprising a rotatable table on which the record member is mounted, means adapted to automatically disengage said needle and record, cause relative returning movement therebetween after said disengagement, and reengagement of said needle and record at a preceding part of the record, said last mentioned means comprising a cam adapted to rotate with said table, and means adapted alternately to prevent and permit rotatable movement of said cam with said table.

5. In an apparatus of the character described, in combination, a record member, a needle adapted to engage the record of said member, means adapted to cause relative rotatable movement between said record member and said needle to play the record comprising a rotatable table on which the record member is mounted, means adapted to automatically disengage said needle and record, cause relative returning movement therebetween after said disengagement, and reengagement of said needle and record at a preceding part of the record, said last mentioned means comprising a cam adapted to rotate with said table, and means adapted alternately to prevent and permit rotatable movement of said cam with said table

comprising an escapement, one member of which is connected to said needle and the other adapted to rotate with said table.

6. In an apparatus of the character described, in combination, a record member, a needle adapted to engage the record of said member, means adapted to cause relative rotatable movement between said record member and said needle to play the record comprising a rotatable table on which the record member is mounted, means adapted to automatically disengage said needle and record, cause relative returning movement therebetween after said disengagement, and reengagement of said needle and record at a preceding part of the record, said last mentioned means comprising a cam adapted to rotate with said table, and means adapted alternately to prevent and permit rotatable movement of said cam with said table comprising an escapement having a pawl adapted to be moved by said needle into and out of the path of a cooperating escapement member movable with said table.

7. In an apparatus of the character described, in combination, a record member, a needle adapted to engage the record of said member, means adapted to cause relative rotatable movement between said record member and said needle to play the record comprising a rotatable table on which the record member is mounted, means adapted to automatically disengage said needle and record, cause relative returning movement therebetween after said disengagement and reengagement of said needle and record at a preceding part of the record, said last mentioned means comprising a cam adapted to rotate with said table, and means adapted alternately to prevent and permit rotatable movement of said cam with said table comprising an escapement, one member of which is connected to said needle and the other adapted to rotate with said table, one of said escapement members being adjustable to vary the point at which the disengagement of said needle and record takes place.

8. In an apparatus of the character described, in combination, a record support, a motor to operate the same, sound reproducing means, means adapted to be frictionally connected with parts operated by the motor comprising a cam member whereby a portion of the sound reproducing means may be returned to a preceding part of the record, and means adapted to control the operation of the second said means to alternately restrain and permit movement thereof with the support.

9. In an apparatus of the character described, in combination, a record support, a motor to operate the same, sound reproducing means, means adapted to be frictionally connected with parts operated by the motor comprising a cam member independ-

ently movable with respect to said support whereby a portion of the sound reproducing means may be returned to a preceding part of the record, and means adapted to control the operation of the second said means to alternately restrain and permit movement thereof with the support.

10. In an apparatus of the character described, in combination, a record support, a motor to operate the same, sound reproducing means, means adapted to be frictionally connected with parts operated by the motor comprising a cam member, whereby a portion of the sound reproducing means may be returned to a preceding part of the record in less than one revolution of the latter, and means adapted to control the operation of the second said means to alternately restrain and permit movement thereof with the record support.

11. In an apparatus of the character described, in combination, a record support, a motor to operate the same, sound reproducing means, means adapted to be frictionally connected with parts operated by the motor, comprising a cam member whereby a portion of the sound reproducing means may be returned to a preceding part of the record, and means comprising a member movable with a portion of the sound reproducing means adapted to control the operation of the second said means to alternately restrain and permit movement thereof with the record support.

12. In an apparatus of the character described, in combination, sound reproducing means, a record member, a member independently movable with respect to the record member, comprising means having a cam adapted to return a portion of the sound reproducing means to a preceding part of the record, and means comprising a member movable with a portion of the sound reproducing means and a member fixed with respect to said cam member adapted to control the operation of the second said means.

13. In an apparatus of the character described, in combination, a record member, a motor to operate the same, sound reproducing means, means adapted to be frictionally connected with parts operated by the motor comprising a cam member whereby a portion of the sound reproducing means may be returned to a preceding part of the record, and means comprising a member movable with a portion of the sound reproducing means and a member fixed with respect to said cam member adapted to control the operation of the second said means to alternately restrain and permit movement thereof with the record member.

14. In an apparatus of the character described, in combination, a record member, a motor to operate the same, sound reproducing means, means adapted to be friction-

ally connected with parts operated by the motor comprising a cam member independently movable with respect to the record member whereby a portion of the sound reproducing means may be returned to a preceding part of the record, and means comprising a member movable with a portion of the sound reproducing means and a member fixed with respect to said cam member adapted to control the operation of the second said means to alternately restrain and permit movement thereof with the record member.

15 15. In an apparatus of the character described, in combination, sound reproducing means, a record member, a member independently movable with respect to the record member, comprising means having a cam adapted to return a portion of the sound reproducing means to a preceding part of the record in less than one revolution of the latter, and means comprising a member movable with a portion of the sound reproducing means and a member fixed with respect to said cam member adapted to control the operation of the second said means.

30 16. In an apparatus of the character described, in combination, a record member, a motor to operate the same, a needle, means adapted to be removably attached to parts operated by the motor comprising a cam plate whereby the needle may be moved away from the record and restored to a preceding part thereof, and means adapted to cause the operation of the first said means at different predeterminable times.

40 17. In an apparatus of the character described, in combination, a record member, a motor to operate the same, a needle, means adapted to be removably attached to parts operated by the motor comprising a cam plate whereby the needle may be moved away from the record and restored to different predeterminable preceding parts thereof, and means adapted to control the operation of the first said means.

50 18. In an apparatus of the character described, in combination, a record member, a motor to operate the same, a needle, means adapted to be removably attached to parts operated by the motor comprising a cam plate whereby the needle may be moved away from the record and restored to different predeterminable preceding parts thereof, and means adapted to cause the operation of the first said means at different predeterminable times.

60 19. In a repeating device for phonographs, or the like, in combination, a motor, a part moved thereby, a movable sound reproducer, a part movable therewith, a cam plate provided with a frictional engaging surface whereby the same may be yieldingly connected to the part moved by the motor for movement with said part, a controlling

member for said plate adapted to be attached to the part movable with the sound reproducer to move therewith, and a member on said cam plate adapted to co-act with said controlling member.

80 20. In a repeating device for phonographs or the like, in combination, a sound reproducer, a plate having a frictional record-engaging surface on its lower side and a cam groove on its upper side, and controlling means for said plate comprising a member movable therewith and a member attached to a movable part of the sound reproducer adapted to co-act with the first said member.

85 21. In a repeating device for phonographs or the like, in combination, a sound reproducer, a plate having a frictional record-engaging surface on its lower side and a cam groove on its upper side, controlling means for said plate comprising a member movable therewith and a member attached to a movable part of the sound reproducer adapted to co-act with the first said member, said groove terminating in a plurality of grooves, and switch means to connect either of said plurality of grooves with the groove proper.

95 22. In a repeating device for phonographs or the like, in combination, a movable sound reproducer, a motor, a plate provided with a frictional engaging surface whereby the same may be yieldingly connected to a part moved by the motor for movement with said part, a stop member on said plate, and a co-acting stop member adapted to move with the movable sound reproducer, one of said members being adjustable to vary the control of the operation of said plate by said members.

105 23. In a device of the character described, in combination, a rotatable table adapted to carry a record, sound-reproducing means adapted to be advanced relatively to said record, and means adapted to return said sound-reproducing means to initial position to cause repetition of the sounds, said means comprising a cam member adapted to be held against rotation with said table during a portion of the travel of said sound-reproducing means on said record and releasable to permit rotation with said table to move said reproducing means out of contact with said record back to a restarting position.

115 24. In a device of the character described, in combination, a rotatable table adapted to carry a record, a movable member having sound-reproducing means associated therewith movable relatively to said record, a cam member adapted to move with said record, and means adapted to restrict the movement of said cam member with said record, said last means adapted to permit movement of said cam member with said record at a predetermined time to cause said

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sound-reproducing means to be returned to a predetermined position.

25. In a device of the character described, in combination, a rotatable table, a movable sound reproducer, a cam member adapted to be associated with the rotatable table, means adapted to be associated with the movable sound-reproducer to restrict the movement of said cam member, and means whereby said last means may release said cam member at a predetermined time allowing the latter to be rotated with said table to cause a return of said sound-reproducer to a predetermined restarting point.

26. In an apparatus of the character described, in combination, a rotatable table, a record member, a sound reproducer movable transversely of the record member, a cam member adapted to rotate with said table and move said sound reproducer to a preceding part of the record, means adapted to prevent the rotation of said cam member with said table comprising a member movable with said sound reproducer, and means permitting said last mentioned means to be set to release said cam member at different points in the path of said transverse movement.

27. In a device of the character described, in combination, a rotatable table, a movable sound reproducer, a cam member comprising a flat plate having inclined edges and a cam groove extending between different inclined edges, said cam member adapted to be associated with the rotatable table, means adapted to be associated with the movable sound-reproducer to restrict the movement of said cam member, and means whereby said last means may release said cam member at a predetermined time allowing the latter to be rotated with said table to cause the sound-reproducer to be raised onto said plate, acted upon by a wall of said cam groove and returned thereby to a predetermined restarting point.

28. In a device of the character described, in combination, a rotatable table, a movable sound reproducer, a cam member comprising a flat plate having inclined edges and a cam groove extending between different inclined edges, said cam member adapted to be associated with the rotatable table, means adapted to be associated with the movable sound-reproducer to restrict the movement of said cam member, and adjustable means whereby said last means may release said cam member at different predetermined times allowing the latter to be rotated with said table to cause the sound-reproducer to be raised on to said plate, acted upon by a wall of said cam member, and returned thereby from different finishing points to a predetermined restarting point.

29. In a device of the character described, in combination, a sound reproducing mecha-

nism comprising a reproducer needle, a cam member adapted to intercept said needle to return the same to cause repetition of the sounds, and means whereby said cam member may be held against interception of the needle during the sound-reproducing operation.

30. In a device of the character described, in combination, a sound reproducing mechanism comprising a reproducer needle, a cam member having a needle contacting portion of material undeleterious to said needle and adapted to intercept said needle to return the same to cause repetition of the sounds, and means whereby said cam member may be held against interception of the needle during the sound-reproducing operation.

31. In a device of the character described, in combination, a sound reproducer, a cam member having an adjustable stop member, and means adapted to be associated with the sound-reproducer to slidably engage said stop member to prevent rotary movement of said cam member while permitting movement of said sound reproducer in the sound-reproducing direction.

32. In a device of the character described, in combination, sound-reproducing mechanism, a cam member adapted to intercept a portion of the sound reproducing mechanism to return the same to cause repetition of the sounds, means whereby said cam member may be held against said interception during the sound reproducing operation and adjustable means associated with said cam member whereby said sound reproducing means may be returned to different restarting points.

33. In an apparatus of the character described, in combination, a rotatable table adapted to support a record, a transportable reproducer needle adapted to engage a record on said table, and a cam rotatable concentrically with said table adapted to automatically disengage said needle and record, move said needle toward the preceding part of said record and permit reengagement of said needle and record at a preceding part of said record.

34. In an apparatus of the character described, in combination, a rotatable table adapted to support a record, a transportable reproducer needle adapted to engage a record on said table, and a cam rotatable concentrically with said table adapted to automatically disengage said needle and record, positively move said needle toward the preceding part of said record while disengaged and permit reengagement of said needle and record at a preceding part of said record.

35. In an apparatus of the character described, in combination, a rotatable table adapted to support a record, a transportable reproducer needle adapted to engage a

record on said table, a rotatable plate having a friction surface adapted to rest on a record on said table, and a cam carried by said plate and rotatable therewith concentrically with said table, said cam being adapted to automatically disengage said needle and record, positively move said needle toward the preceding part of said record while disengaged and permit reengagement of said needle and record at a preceding part of said record.

36. In an apparatus of the character described, in combination, a rotatable table adapted to support a record, a transportable reproducer needle adapted to engage a record on said table, a rotatable plate having a friction surface adapted to rest on a record on said table, and a cam groove on said plate and rotatable therewith concentrically with said table, said cam groove being traversed by said needle and adapted to automatically disengage said needle and record, positively move said needle toward the preceding part of said record while disengaged and permit reengagement of said needle and record at a preceding part of said record.

37. In an apparatus of the character described, in combination, a rotatable table adapted to support a record, a transportable reproducer needle adapted to engage a record on said table, a rotatable plate adapted to rest on a record on said table, said plate having a recess adapted to permit the needle to engage the record, and a cam carried by said plate and rotatable therewith concentrically with said table, said cam being adapted to automatically disengage said needle and record, positively move said needle toward the preceding part of said record while disengaged and permit reengagement of said needle and record at a preceding part of said record.

38. In an apparatus of the character described, in combination, a record member, a pivoted arm, a needle connected to said arm and adapted to engage said member, means adapted to cause relative rotatable movement between said record member and said needle to play the record comprising a rotatable table on which the record member is mounted, means adapted to automatically disengage said needle and record, cause relative returning movement therebetween after said disengagement, and reengagement of said needle and record at a preceding part of the record, said last mentioned means comprising a cam adapted to rotate with said table, and means adapted alternately to prevent and permit rotatable movement of said cam with said table comprising an

escapement, one member of which is yieldingly connected to said arm and the other adapted to rotate with said table.

39. In an apparatus of the character described, in combination, a rotatable table, a record member, a sound reproducer movable transversely of the record member, a cam member adapted to be frictionally connected with said record member to rotate concentrically therewith and move said sound reproducer to a preceding part of the record, means adapted to prevent the rotation of said cam member with said record comprising a part movable with said sound reproducer, and means permitting said last mentioned means to be set to release said cam member at different points in the path of said transverse movement.

40. In a repeating mechanism for talking machines the combination of a rotatable record table, a reproducer needle, a cam rotatable with said table and adapted to lift said needle from an operative position at the end of a selection and move it in its operative position across the face of the table approximately to the starting point of said selection and means connected with said cam for permitting said needle to return to an operative position as said starting point is reached.

41. The combination with a talking machine of means adapted to be driven by frictional contact with the record for restoring said machine to a condition to repeat the playing of the record, and means for preventing the movement of said repeating means during the playing of the record.

42. The combination with a talking machine including a rotary platen, a pivoted tone arm, a sound box carried by said tone arm and a record disk carried by said platen, said sound box having a substantially radial movement across said record disk, of means adapted to be placed upon said record disk and driven through frictional contact therewith for restoring said tone arm and sound box to initial position after the playing of the record, and cooperating stops associated with said repeating means and sound box for holding said repeating means against movement with said record during the playing of the record, but releasing said repeating means at the completion of the playing of the record.

In testimony whereof I affix my signature in the presence of two witnesses.

EDMUND S. GEER.

Witnesses:

JESSE A. HOLTON,
C. J. KULBERG.

SOUND CONTROL FOR TALKING
MACHINES,

1,173,758-----V. W. WECERZICK,
Patented-Feb. 29th, 1916.
Filed-Aug. 10th, 1915.

V. W. WECZERZICK.
SOUND CONTROL FOR TALKING MACHINES.
APPLICATION FILED AUG. 10, 1915.

1,173,758.

Patented Feb. 29, 1916.

Fig. 1,

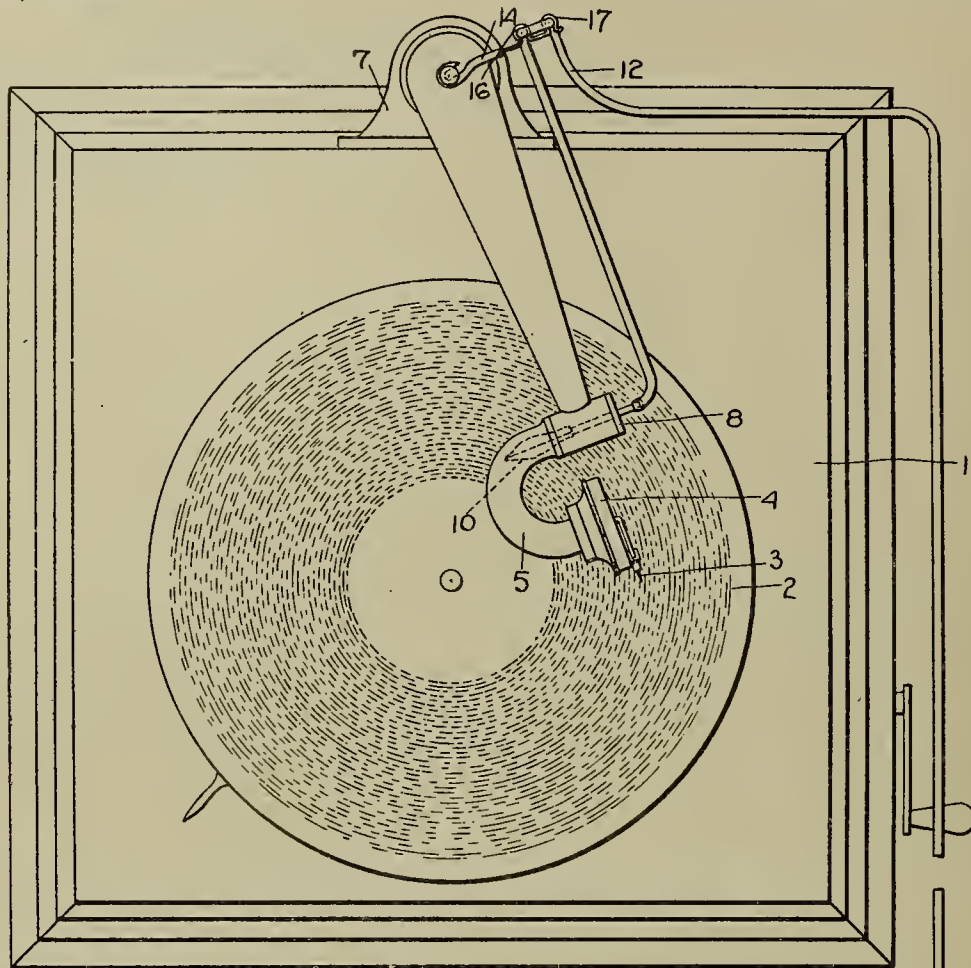


Fig. 2,

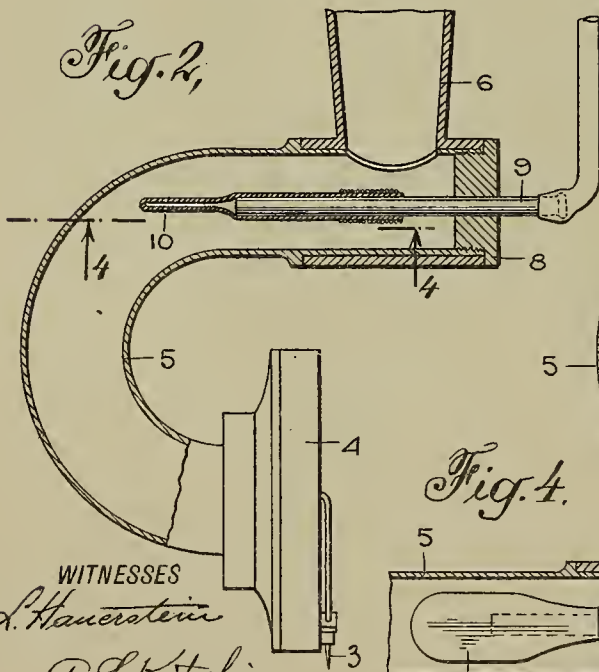


Fig. 3,

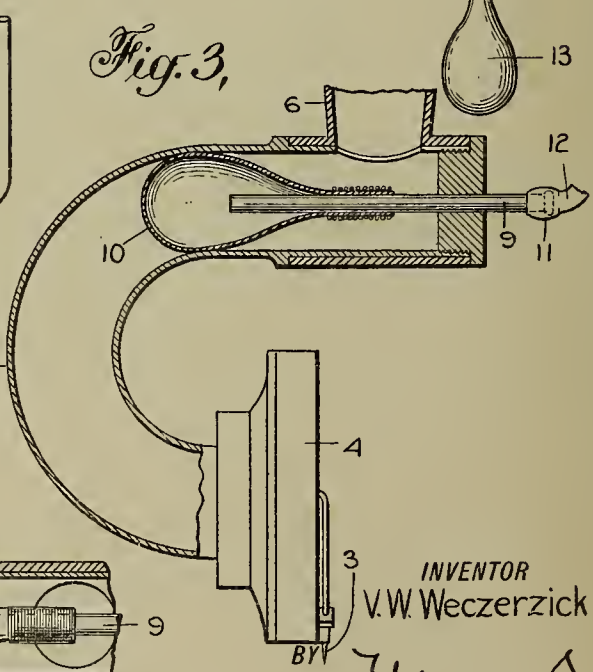
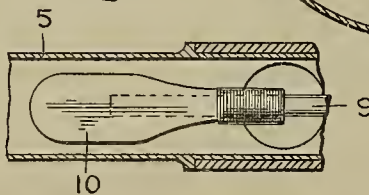


Fig. 4.



WITNESSES
S. Hauerstein
A. L. Kitchen

INVENTOR
V. W. Weczerzick
BY *[Signature]*
ATTORNEYS

UNITED STATES PATENT OFFICE.

VINCENT W. WECZERZICK, OF NEW YORK, N. Y.

SOUND CONTROL FOR TALKING-MACHINES.

1,173,758.

Specification of Letters Patent. Patented Feb. 29, 1916.

Application filed August 10, 1915. Serial No. 44,694.

To all whom it may concern:

Be it known that I, VINCENT W. WECZERZICK, a citizen of the United States, and a resident of the city of New York, borough
5 of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Sound Control for Talking-Machines, of which the following is a full, clear, and exact description.

10 This invention relates to attachments for talking machines and particularly to an improved device for controlling the volume of sound thereof.

Another object in view is to provide a device
15 vice for controlling the volume of sound arranged in the gooseneck of the talking machine or at some other convenient point in any part of the quantity or volume of sound tube, whereby the tone is affected according to the movement of the controlling
20 device.

A still further object in view is to provide a pneumatic bulb in the sound tube or the
25 gooseneck of the talking machine and connected therewith a tube and bulb whereby the bulb in the sound tube or gooseneck may be inflated or deflated at will and to any extent for varying the volume of sound according to the particular temperament of
30 the person operating the device.

In the accompanying drawings: Figure 1 is a top plan view of a talking machine with an embodiment of the invention applied thereto; Fig. 2 is a sectional view through a
35 gooseneck and part of the sound tube of a talking machine with an embodiment of the invention positioned therein: Fig. 3 is a view similar to Fig. 2 but with the control bulb distended; Fig. 4 is a detail fragmentary sectional view on line 4—4 of Fig. 2
40 showing the width of the bulb as distended as being less than the width of the gooseneck.

Referring to the accompanying drawings
45 by numerals, 1 indicates a casing of a talking machine, which may be of any desired type, and 2 a record. The needle or stylus 3 of the machine engages the record 2 in the usual manner and is carried by the sound
50 box 4 which in turn is carried by the gooseneck 5 swiveled on the tone tube 6 mounted in any suitable manner at 7 on one side of the casing 1. The detail construction of these parts of the talking machine is well

known and consequently forms no part of 55 the present invention.

In swiveling the gooseneck 5 in position a nut 8 is provided which may be easily applied and removed at any time. Extending through nut 8 is a tube 9 to which a pneu- 60 matic bag 10 is secured. The bag or bulb 10 is preferably of a good quality of thin rubber and when deflated appears in section as shown in Fig. 2 or in plan as shown in Fig. 4. It will be observed that the bulb 10 does 65 not touch the gooseneck 5 unless distended by having air forced therein, as shown in Fig. 3. As the air is forced in through tube 9 the bag or bulb will begin to take a globular form, as shown in dotted lines in Fig. 70 1, and consequently partially fill the gooseneck 5 without, however, touching the walls thereof, thus varying the quantity or volume of sound to a greater or less extent according to the inflation of the bag. When the 75 bag is inflated until the same presses tightly against the walls of the gooseneck 5 the sound is completely shut off or, rather, is shut off as much as possible so that only a small sound will be transmitted to the horn 80 or sounding board of the machine.

Preferably the tube 9 is metal, though it may be any other suitable material, and is arranged to extend into the bag 10 as more particularly shown in Fig. 3 and be secured 85 thereto in any suitable manner, as for instance, by an adhesive or a winding of thread or cord. The outer end of the tube 9 is enlarged at 11 so as to spread the flexible air tube 12 as shown in Figs. 2 and 3. 90 Tube 12 may be of any length so that a person may be positioned at a suitable distance from the talking machine and yet be in a position to operate the bulb 13 which acts in a certain capacity as a pump except 95 that it is preferably not provided with a valve, so that when it is collapsed air is forced into the bulb or bag 10 and when the bulb is released the air is withdrawn from the bag 10. In order that there will 100 be no accidental jerking or movement of the tone tube 6 by reason of a pull on the tube 12, a hook 14 is fitted over the pivotal member 15 provided on the machine 1. The hook 14 is also provided with loops 16 and 105 17 through which the tube 12 is passed, as shown in Fig. 1, so that if any one gives an accidental pull to the tube 12 the same will

act on hook 14 and on pin 15 without in any way affecting the stylus 3 or associated parts.

In operation, when the parts are in the position shown in Fig. 1 and the talking machine is operated, a person may grasp bulb 13 and press the same at any time and to any extent for modulating or controlling in any way the volume of sound according to the particular temperament or mood of the person using the device. It will be noted that the device may be quickly applied and removed whenever desired so that if any one does not wish to use the device the same may remain idle and on the machine or may be removed and a new nut 8 substituted for the nut 8 having the tube arranged therein.

What I claim is:—

1. In a sound controlling device, the combination with a talking machine having sound tubes, of an inflatable member arranged in said sound tube, and means extending to a distance for inflating said inflatable member and thereby varying the volume of sound passing through the sound tube.

2. A sound controlling device for talking machines, comprising an expansible bulb adapted to be inserted into the sound carrying tube of a talking machine, and means arranged exteriorly of said tube for inflat-

ing and deflating said bulb whereby the volume of sound may be varied according to the desire of the operator.

3. A sound controlling device comprising an expansible bulb or bag, a tube of an appreciable length connected therewith, and a bulb connected with said tube, said last mentioned bulb being adapted to be collapsed by the hand for inflating the first mentioned bulb or bag.

4. A sound controlling device comprising an elongated inflatable bag adapted to be fitted into the gooseneck of a talking machine, said bag being of less width than the diameter of said gooseneck, a tubular member fitted into the retaining screw of the gooseneck and extending into said bag, a flexible air tube connected with said tubular member, and a hand bulb connected with said flexible tube whereby when said hand bulb is collapsed air will be forced into said bag for inflating the same, the inflation of said bag corresponding to the deflation of said hand bulb.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

VINCENT W. WECZERZICK.

Witnesses:

A. L. KITCHIN,
PHILIP D. ROLLHAUS.

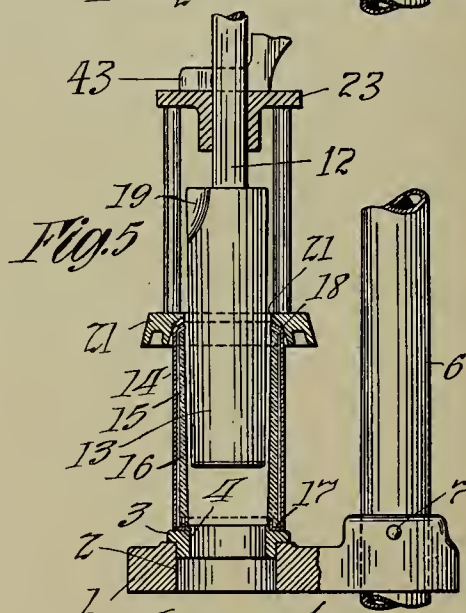
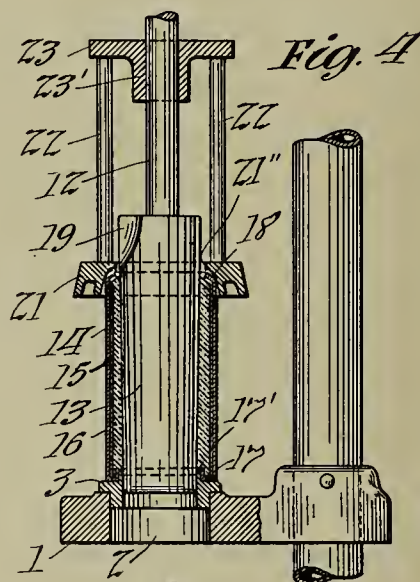
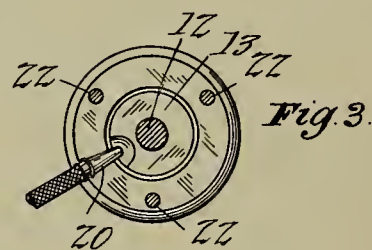
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

APPARATUS FOR MANUFACTURING
PHONOGRAPH RECORDS,

1,174,274-----B.F.Philpot & H.A.Cook,
Patented-March 7th, 1916.
Filed-April 22nd, 1913.

1,174,274.

2 SHEETS—SHEET 1.



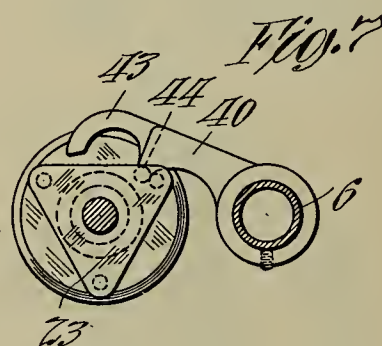
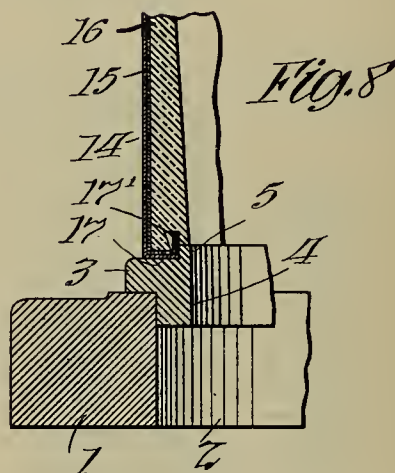
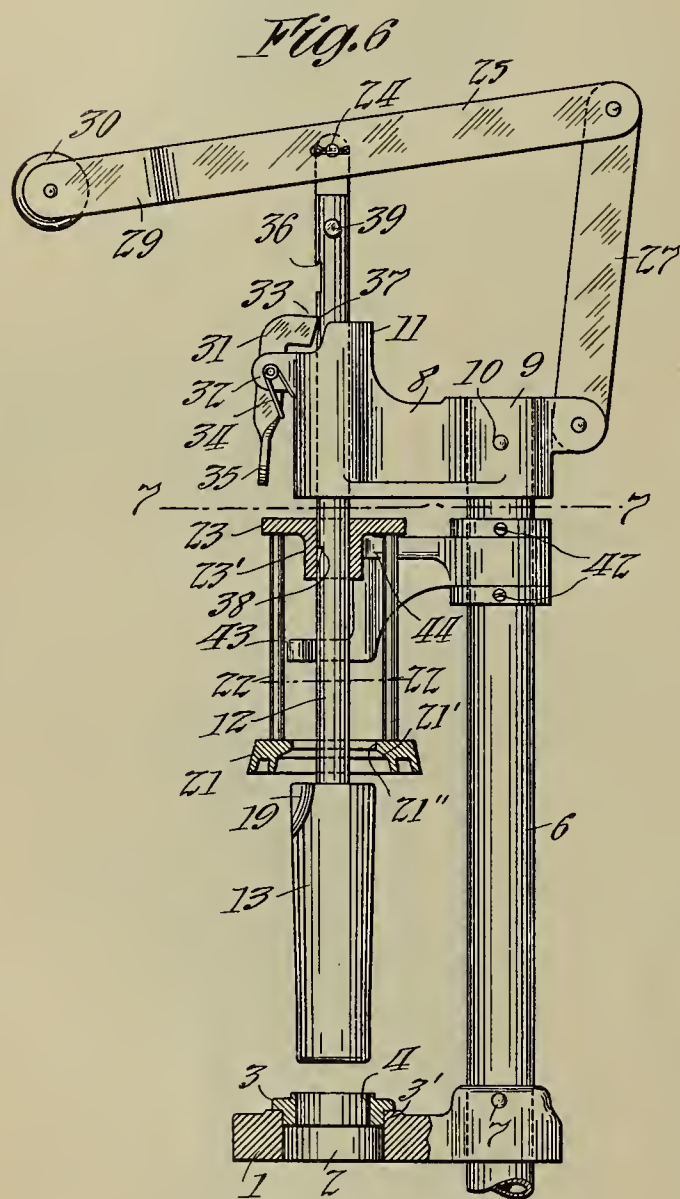
C.E. Brown.
Frederick Bachmann.

Brian F. Philippot and
 Herbert A. Cook
 Dyer & Holden
 their Allies

B. F. PHILPOT & H. A. COOK.
 APPARATUS FOR MANUFACTURING PHONOGRAPH RECORDS.
 APPLICATION FILED APR. 22, 1913.

1,174,274.

Patented Mar. 7, 1916.
 2 SHEETS—SHEET 2.



Witnesses:

C. E. Brown.
Frederick Bachmann.

Inventors:
Brian F. Philpot and
Herbert A. Cook
 by *Dyer & Holden*
Their Attys

UNITED STATES PATENT OFFICE.

BRIAN F. PHILPOT, OF ORANGE, AND HERBERT A. COOK, OF EAST ORANGE, NEW JERSEY, ASSIGNORS, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR MANUFACTURING PHONOGRAPH-RECORDS.

1,174,274.

Specification of Letters Patent.

Patented Mar. 7, 1916.

Application filed April 22, 1913. Serial No. 762,854.

To all whom it may concern:

Be it known that we, BRIAN F. PHILPOT, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, and HERBERT A. COOK, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Manufacturing Phonograph-Records, of which the following is a description.

Our invention relates to apparatus for manufacturing phonograph records, and more particularly to apparatus whereby a record shell may be provided with a backing suitable for supporting the record on a phonograph mandrel or other record support.

The principal object of the invention is to provide improved means for facilitating the formation of the backing within the record shell.

A further object of the invention is to provide means for protecting the outer surface of the record shell from the deposit thereon of the backing material during the formation of the backing.

Other objects of the invention will appear more fully in the following specification and appended claims.

In order that our invention may be more clearly understood, attention is hereby directed to the accompanying drawings forming a part of this specification and in which; Figure 1 is a view partly in side elevation and partly in section of apparatus embodying the preferred form of the invention and arranged with the parts in position for the introduction of the backing material within the record shell; Figs. 2 and 3 are views in section taken respectively on the lines 2—2 and 3—3 of Fig. 1. Figs. 4 and 5 are fragmentary views similar to that of Fig. 1 showing the apparatus with the parts in different relative positions to be hereinafter more fully described; Fig. 6 is a view similar to that of Fig. 1 showing the apparatus with the parts in still another position; Fig. 7 is a view in section taken on the line 7—7 of Fig. 6; and Fig. 8 is a detail view in ver-

tical section showing a portion of the record in position on its support.

In all of the views like parts are designated by the same reference numerals.

Referring to the drawings, the numeral 1 designates a base which is provided with a vertical opening 2. An annular member 3 rests upon the top of the member 1 and is provided with a portion secured within the upper portion of the opening 2. The central opening 4 through the member 3 is in vertical alinement with the opening 2. A narrow annular flange 5 surrounding the opening 4 (see Fig. 8) projects upwardly from the top of the member 3 and is adapted to engage one end of the record shell, as will be hereinafter more fully described. Extending vertically upward from the rear portion of the base 1 is the standard 6. This standard, as shown, is in the form of a pipe and extends through and below the base 1, being secured to the latter, as by a pin 7. With this construction, the base 1 is adapted to be supported on a table or other similar support with the pipe 6 extending through the top of the table and secured beneath the same in any suitable manner. An arm 8 provided with a tubular portion 9 surrounding the standard 6 and secured to the latter, as by a pin 10, projects forwardly from the said standard at a suitable distance above the base 1. The forward portion of the arm 8 is also formed with a tubular portion, as shown at 11, which tubular portion is adapted to form a guide for a vertical rod 12 on the lower portion of which is secured a core 13 of circular cross section tapering inwardly from the upper to the lower end thereof. The sleeve 11, rod 12, mandrel or core 13, as well as the openings 2 and 4 are in axial alinement with each other and the diameter of the opening 4 is such that when the core 13 is in operative position for the introduction of the backing material within the record shell 14, as shown in Fig. 1, the lower portion of the core 13 will completely close the opening 4 and together with the flange 5 prevent the escape of the backing material from the lower end of the record.

The record herein disclosed is of the type

disclosed and claimed in an application of Thomas A. Edison, Serial No. 672,397, filed January 20, 1912 and is not a part of the present invention. The outer celluloid shell 14 is shown at 15 as provided with a thin coating of rubber or other suitable yielding resilient material within which is formed a plaster backing 16. The celluloid shell is formed at its ends with inwardly directed flanges 17 and 18, the lower flange 17 being formed with a longitudinally extending portion 17' which is adapted to fit closely about the flange 5, as clearly shown in Fig. 8, whereby the record shell may be supported at its lower end in axial alinement with the core 13. The upper flange 18 is of such inner diameter as to extend into proximity to the core 13 but not to contact the latter when the said core is in operative position within the record shell. In Fig. 1, the backing 16 is shown as only partly completed. We preferably provide the upper portion of the core with an inclined notch 19 which serves to facilitate the introduction of the backing material within the record shell and around the core 13, as clearly shown in Fig. 1. The backing material may be injected into the passage 17 through a nozzle 20 connected with a suitable reservoir (not shown), the said material during this operation being preferably in a thinly fluid state when the backing is formed of plaster of Paris or the like. The provision of a slight space between the flange 18 and core permits the escape of air from within the record shell when the backing material is being introduced into the latter.

To protect the outer surface of the record shell against the deposit thereon of the backing material, we preferably provide a guard 21, which may be in the form of an apron resting upon the upper portion of the record shell and extending outwardly and downwardly from the latter. The guard 21 is formed with an inclined conical surface 21' which is adapted to engage the edge of the record shell between the outer cylindrical surface thereof and the flange 18, to center the upper portion of the said shell. By means of the flange 5 on the base 1 and the guard 21 the record shell is accordingly firmly held in axial alinement with the core 13 and the inner surface of the backing is thus formed true or coaxial with the outer surface of the record. The apron 21 may be supported by vertical rods 22 secured to and projecting from the lower surface of a flange 23 formed on a collar 23' which is slidably mounted on the rod 12. The said apron is provided with a central opening 21'' whereby the core 13 may be moved through the same, the guard 21 being adapted to be supported when the core 13 is in a raised position or when there

is no record shell in position on the apparatus, by the engagement of the collar 23' with the upper surface of the core.

To permit an easy manual reciprocation of the rod 12, we preferably pivot to the upper end of the rod 12, as at 24, an operating lever 25, this lever being pivoted at its rear end, as at 26, to the upper end of a link 27, which latter is pivoted at its lower end, as at 28, between ears projecting rearwardly from the arm 8. The forward portion of the lever 25 is preferably forked, as shown at 29, a handle 30 extending across the forked portion to facilitate the convenient operation thereof. In order to permit the rod 12 and the core 13 supported thereby to be conveniently held or supported at a proper elevation, we provide a catch 31 pivoted between outstanding ears 32 at the front of sleeve 11. The catch 31, as shown, is provided with a locking nose 33 which is yieldingly pressed into engagement with the rod 12, as by a spring 34, and also with a flat thumb piece 35 for operating the catch to disengage the nose 33 from the rod 12. The elevation at which the rod 12 and the core 13 are held by the latch 31 is determined by notches 36, 37 and 38 at different elevations in the rod 12. A projection 39 extends laterally from the rod 12 and is adapted to rest upon the upper portion of the sleeve 11 to support the rod 12 and core 13 in their lowermost positions, as shown in Fig. 1.

To lock the guard in engagement with the upper surface of the record, I provide an arm 40 pivoted on the standard 6 and held against longitudinal movement on the latter by collars 41 engaging the upper and lower surfaces of the said arm, these collars being held in position as by set screws 42. The arm 40 is provided at its outer end with a hook shaped portion 43 adapted to surround the rod 12 and to engage the upper surface of the part 23, as shown in Fig. 1, when it is desired to lock the guard in engagement with the top of the record shell. A projection 44 extends from the upper part of the arm 40 and is adapted to engage the under surface of the flange 23, as shown in Figs. 6 and 7, to support the guard in elevated position independently of the core 13.

In operating the apparatus hereinbefore described, the catch 31 is released and the lever 25 operated until the notch 37 in the rod 12 is brought in position to be engaged by the locking nose 33 (see Fig. 6). When the parts are in this position, the pressure of the spring 34 on the part 31 and the downward pull of the rod 12 serve to hold the catch and the rod in locking engagement and thereby to hold the rod 12 and core 13 at a proper elevation. The guard is now raised and the part 44 of the arm 40 moved

under the flange 23 to support the guard 21 in an elevated position entirely above the core 13, as shown in Fig. 6. With the parts in this position unobstructed access
 5 may be had to the core 13; and the latter may be greased with crude oil or any other suitable means so as to prevent the plaster of Paris or other backing material from adhering thereto during the subsequent operations. The parts are next adjusted to
 10 the position in which the catch 31 engages the notch 38 and the collar 23' rests upon the upper portion of the core 13, both of these parts being thereby sufficiently elevated to permit the placing of a record shell
 15 in position on the supporting ring 3. For a record such as herein disclosed, the rubber film 15 is formed upon the celluloid cylinder 14 before the same is placed in position on the said ring. With the record
 20 shell in place, the parts are arranged in the position shown in Fig. 1, in which the projection 39 engages the upper portion of the sleeve 11, the guard apron 21 being in engagement with the upper portion of the
 25 record and being held in position on the latter by the engagement of the part 43 of the arm 40 with the upper surface of the part 23. In this position, as hereinbefore stated, the lower portion of the record shell
 30 is completely closed by the core 13 and flange 5 so that the record material may be introduced as shown in Fig. 1 into the space within the record shell 14 and around the
 35 core 13. After a sufficient amount of backing material has been introduced within the record shell, the rod 12 and core 13 are elevated until the catch 31 engages the notch 36, the object of this operation being to
 40 raise the notch 19 in the core above the record so as to prevent the formation of a rib on the backing when the latter hardens, the core, however, still extending throughout the length of the record shell. With
 45 the parts in the position last described, the backing material which is in close engagement with the record shell and the core, is permitted to set so that the backing assumes substantially the correct form or shape for
 50 support on a record mandrel, after which the core is lifted out of the backed up record shell. During the initial portion of this lifting operation the guard 21 is held firmly in engagement with the top of the record
 55 and holds the latter firmly in position, as shown in Fig. 5, so that the core is very readily detached from the backing. To lift the core completely out of the record, the arm 40 is swung to one side and the lever
 60 25 operated to bring the catch 31 into engagement with the notch 38. During this operation the collar 23' is engaged by the upper portion of the core and the guard 21 is lifted above the top of the record.
 65 The latter may now be removed from the

backing apparatus herein disclosed, and completely dried in an oven, reamed, and finished up in any suitable manner.

While we have described the preferred form of our invention, numerous changes
 70 may be made therein without departing from the spirit thereof; and we wish, therefore, not to be limited to the exact details herein disclosed.

What we claim as new and desire to protect by Letters Patent of the United States is as follows:

1. In a device of the class described, the combination of means for supporting a record shell in a given position, and a forming
 80 core adapted to be positioned axially within said shell, said core being provided with means whereby backing material may be introduced within said shell when the core is in its normal position within the latter,
 85 substantially as described.

2. In a device of the class described, the combination of means for supporting a record shell in a given position, and a forming
 90 core adapted to be positioned axially within said shell, said core being provided with a passage whereby backing material may be introduced within said shell when the core is in its normal position within the latter,
 95 substantially as described.

3. In a device of the class described, the combination of a support for a record shell, and a forming core adapted to be positioned
 100 axially within said shell, said core being provided with means whereby backing material may be introduced within said shell when the core is in its normal position within the latter, and said means being movable
 105 out of said shell without withdrawing the body portion of the core from the shell, substantially as described.

4. In a device of the class described, the combination of means for supporting a record shell in a given position, a forming core
 110 adapted to be positioned axially within said shell, said core being provided with means whereby backing material may be introduced within said shell when the core is in its normal position within the shell, and means
 115 for producing relative movement between said core and said supporting means in a direction extending axially of the core, substantially as described.

5. In a device of the class described, the combination of means for supporting a record shell in a given position, a core adapted
 120 to be positioned axially within said shell, and means for producing relative movement between said core and said supporting means in a direction extending axially of
 125 the core, said core being provided with means whereby backing material may be introduced within the shell when the core is in its normal position within the shell, said
 130 last named means being movable out of the

shell without withdrawing the body portion of the core from the shell, substantially as described.

6. In a device of the class described, the combination of means for supporting a record shell in a given position, a forming core adapted to be positioned axially within said shell, and a guard for shielding the outer surface of the shell against the deposit of backing material thereon, said core being provided with means whereby backing material may be introduced within the shell when the core is in its normal position within the shell, substantially as described.

7. In a device of the class described, the combination of means for supporting a record shell in a given position, a forming core adapted to be positioned axially within said shell, a guard for shielding the outer surface of the shell against the deposit of backing material thereon, and means for producing relative movement between said core and said supporting means in a direction extending axially of the core, said core being provided with means whereby backing material may be introduced within the shell when the core is in its normal position within the shell, substantially as described.

8. In a device of the class described, the combination of means for supporting a record shell in a given position, a forming core adapted to be positioned axially within said shell and an apron arranged to extend outwardly from the record shell for shielding the outer surface of the shell against the deposit of backing material thereon, said core being provided with means whereby backing material may be introduced within the shell when the core is in its normal position within the shell, substantially as described.

9. In a device of the class described, the combination of means for supporting a record shell in a given position, a forming core adapted to be positioned axially within said shell, an apron arranged to extend outwardly from the record shell for shielding the outer surface of the shell against the deposit of backing material thereon, and means for producing relative movement between said core and said supporting means in a direction extending axially of the core, said core being provided with means whereby backing material may be introduced within the shell when the core is in its normal position within the shell, substantially as described.

10. In a device of the class described, the combination of means for supporting a record shell in a given position, a forming core adapted to be positioned axially within said shell, means for producing relative movement between said core and said supporting means axially of the core, and means comprising a pivoted locking member for hold-

ing the shell firmly in position on said supporting means, substantially as described.

11. In a device of the class described, the combination of means for supporting a record shell in a given position, a core adapted to be positioned axially within said shell, means for producing relative movement between said core and said supporting means axially of the core, and means for holding the shell firmly in position on said supporting means, said core being provided with means whereby backing material may be introduced within the shell when the core is in its normal position within the shell, substantially as described.

12. In a device of the class described, the combination of means for supporting a record shell in a given position, a forming core adapted to be positioned axially within said shell, said core permitting the introduction of backing material within said shell when in normal position within the same, a guard for shielding the outer surface of the shell against the deposit of backing material thereon, means for producing relative movement axially of said core between the latter and said supporting means, and means co-acting with said guard for holding said shell firmly in position on said supporting means, substantially as described.

13. In a device of the class described, the combination of means for supporting a record shell in a given position, a forming core adapted to be positioned axially within said shell, said core being provided with means whereby backing material may be introduced within the shell when the core is in its normal position within the shell, means for producing relative movement axially of the core between the latter and said supporting means, and means whereby said core and shell may be held in operative relation for the introduction of backing material within the shell, substantially as described.

14. In a device of the class described, the combination of means for supporting a record shell or the like in a given position, a forming core adapted to be positioned axially within the shell, and means comprising a rod and a lever connected to said rod for producing relative movement axially of said core between said core and said supporting means, substantially as described.

15. In a device of the class described, the combination of means for supporting a record shell in a given position, a forming core adapted to be positioned axially within said shell, means for producing relative movement axially of the core between the latter and said supporting means, said core being provided with a passage whereby backing material may be introduced within the shell when the core is in its normal position within the shell, said passage being movable out of the shell without withdrawing the

body of the core from the shell, and means whereby the core may be held in a position with the passage without the shell but with the body portion of the core within the same, substantially as described.

16. In a device of the class described, the combination of means for supporting a record shell in a given position, a forming core adapted to be positioned axially within said shell, means for producing relative movement axially of the core between the latter and said supporting means, said core being provided with a passage whereby backing material may be introduced within the shell when the core is in its normal position within the shell, said passage being movable out of the shell without withdrawing the body of the core from the shell, and means whereby said core and supporting means may be held in operative relation for the introduction of backing material into the shell or in a position with the passage without the shell but with the body portion of the core within the same, substantially as described.

17. In a device of the class described, the combination of means for supporting a record shell in a given position, a forming core adapted to be positioned axially within said shell, a guard to shield the outer surface of the shell, means for producing relative

movement axially of the core between the latter and said supporting means, and means for holding said guard in a position beyond said core to permit unobstructed access to the surface of said core, substantially as described.

18. In a device of the class described, the combination of means for supporting a record shell or the like in a given position, a forming core adapted to be positioned axially within the shell, means comprising a rod connected to said core and a lever connected to said rod for producing relative movement axially of said core between said core and said supporting means, and means comprising a catch coacting with said rod whereby said core may be held in inoperative position, substantially as described.

This specification signed and witnessed this 16th day of April, 1913.

BRIAN F. PHILPOT.
HERBERT A. COOK.

Witnesses to signature of Brian F. Philpot:

FREDERICK BACHMANN,
MARY J. LAIDLAW.

Witnesses to signature of Herbert A. Cook:

FREDERICK BACHMANN,
WILLIAM A. HARDY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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MACHINE FOR SHAVING SOUND RECORDS,
1,174,292-----C. Schiff,
Patented-March 7th, 1916.
Filed-June 21st, 1913.

C. SCHIFFL.
MACHINE FOR SHAVING SOUND RECORDS.
APPLICATION FILED JUNE 21, 1913.

1,174,292.

Patented Mar. 7, 1916.

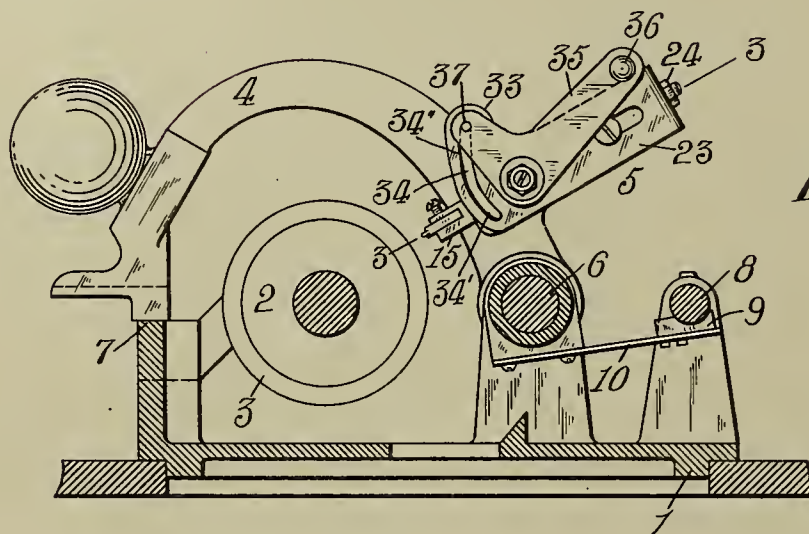


Fig. 1

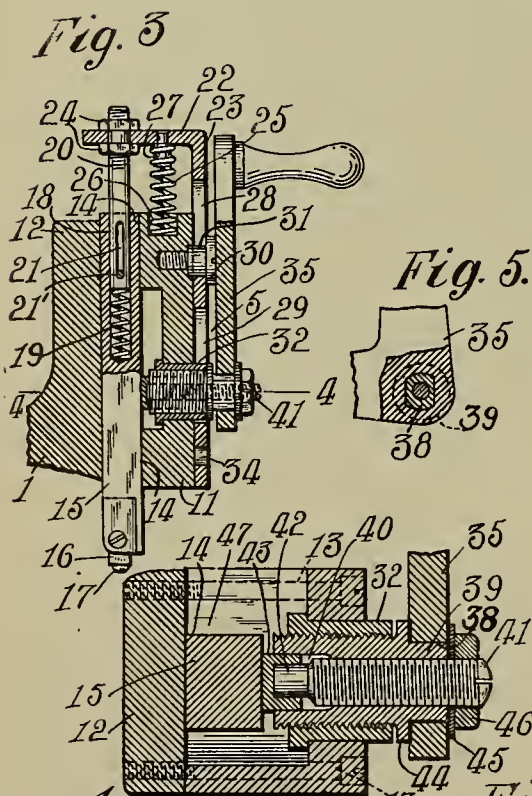


Fig. 3

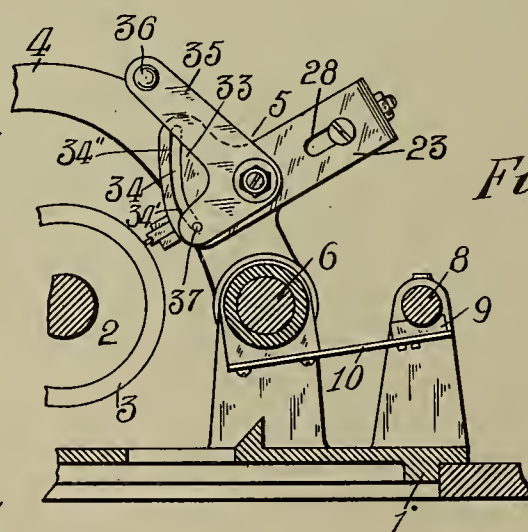


Fig. 2

Fig. 5.

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Charles Schiffel
by Dyer & Holdrege
his Atty's.

UNITED STATES PATENT OFFICE.

CHARLES SCHIFFL, OF MONTCLAIR, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR SHAVING SOUND-RECORDS.

1,174,292.

Specification of Letters Patent.

Patented Mar. 7, 1916.

Application filed June 21, 1913. Serial No. 775,028.

To all whom it may concern:

Be it known that I, CHARLES SCHIFFL, a citizen of the United States, and a resident of Montclair, Essex county, New Jersey, have invented certain new and useful Improvements in Machines for Shaving Sound-Records, of which the following is a description.

My invention relates to machines for shaving sound records when it is desired to remove the outer portion of a sound record tablet in which the record is impressed in order that a fresh surface may be presented to be recorded upon, and more particularly to an improved construction for effecting the movement of the shaving knife into and out of operative position and the locking of the same in operative position.

My invention has been especially designed for embodiment in machines in which the shaving knife is adapted to be held in engagement with a rotating record of wax-like material, such as are described, for example, in a patent to John Ott, No. 796,857, dated August 8, 1905, and in an application of Frank E. Traphagen, Serial No. 592,976, filed November 18, 1910, and entitled Shaving knife for sound records. In machines of this character heretofore employed, much difficulty has been experienced in readily effecting an adjustment of the shaving knife to secure the proper cut, that is, a cut that is neither too deep nor too shallow.

The principal object of my invention is to obviate this objection, and in accordance with this object I provide in a machine of this type, an improved construction whereby, regardless of the amount of material which has previously been shaved from a record for which the machine is adapted, a single and easy manipulation first effects the engagement of the cutting tool of the shaving knife with the record and the projection thereof into the material of the record such a distance as to secure the proper depth of cut, and thereafter effects the locking of the knife in such position, and whereby another single manipulation first effects the release of the knife and thereafter the return thereof to inoperative position.

Another object of my invention resides in rendering the last mentioned action more or less automatic.

My invention also contemplates the provision of a device in the form of an attachment adapted to be readily applied to shaving machines in use for accomplishing the above results.

Further objects and features of my invention will appear more fully in the following description and appended claims.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawings, forming part of this specification, and in which:

Figure 1 is a side elevation, partly in section, of a record shaving machine in accordance with my invention with the shaving knife in inoperative position. Fig. 2 is a fragmentary view similar to Fig. 1 with the shaving knife locked in operative position. Fig. 3 is an enlarged sectional view on line 3—3 of Fig. 1, parts being shown in elevation. Fig. 4 is an enlarged sectional view on line 4—4 of Fig. 3, a part being omitted; and Fig. 5 is a fragmentary view, partly in section, showing the connection between the actuating bell crank lever and the mounting therefor.

In all the views like parts are designated by the same reference characters.

Referring to the drawing, 1 represents the frame of the shaving machine having a mandrel 2 for supporting the record 3 to be shaved, and also having an arm or carriage 4 carrying the shaving mechanism 5. Carriage 4 is slidably mounted on the usual back rod 6 and the straight edge 7 and is adapted to be moved longitudinally of the record by the feed screw 8 coöperating with the usual feed nut 9 carried by spring support 10, which support is secured to the arm or carriage 4 in the manner common to machines of this type.

Referring especially to Figs. 3 to 5, the shaving device comprises a supporting member 11 which carries the shaving knife and the mechanism for effecting movement of the latter into and out of operative position and for locking the same in operative position. The supporting member 11 is preferably rectangular in shape and is suitably secured to a projection 12 formed on carriage 4, as by screw bolts 13, with one of its flat sides in engagement with a flat surface formed on projection 12. The

flat side of support 11 adjacent projection 12 is provided with a longitudinal groove 14 preferably rectangular in shape, the walls of which together with the flat surface of projection 12 form a guideway in which is slidably mounted bar 15 of the shaving knife. Bar 15 is preferably rectangular in cross section and fits closely in its guideway. A member 16 provided with a suitable cutting tool 17, preferably of sapphire, is mounted in the lower end of bar 15 in any suitable manner. The upper end portion of bar 15 is provided with a longitudinally extending recess 18 in the lower portion of which is seated a spring 19, and in the upper portion of which is slidably mounted a rod 20, the lower end of the rod 20 engaging spring 19, whereby a resilient connection is provided between bar 15 and rod 20. In order to limit the movement of rod 20 with respect to bar 15 I provide rod 20 with a longitudinally extending slot 21 through which passes a pin 21' secured to bar 15. The upper end of rod 20 is screw threaded and passes loosely through an aperture provided in a right-angled extension 22 of a plate 23, being adjustably secured to this extension by means of the lock nuts 24. A strong coiled spring 25, seated at one end in a recess 26, provided in support 11, and bearing at its other end against the under side of extension 22, serves to constantly exert a force tending to so move member 23 and rod 20 as to hold the shaving knife in retracted or inoperative position, as shown in Fig. 3. A stud 27 secured to extension 22 and about which the upper end of spring 25 engages, prevents lateral movement of the latter with respect to the extension. Member 23 is provided with a pair of aligned slots 28 and 29, and is slidably mounted on that side of member 11 opposite the side in which groove 14 is formed, by means of a screw 30, screwed into support 11 and formed between its head and screw threaded end portion with a smooth cylindrical portion 31 which fits in slot 28, and a cylindrical hollow bearing piece or collar 32 suitably secured to support 11 and provided with a portion extending beyond support 11 and fitting in slot 29. The end of member 23 opposite the right angled extension 22 is provided with an enlargement 33 in which is formed an irregular slot 34, the lower and upper portions of which are formed on different curves. In order to control the movements of member 23 and thereby those of the shaving knife, I provide suitable actuating means, preferably a pivotally mounted bell crank lever 35, one arm of which is provided with a handle 36 and the other arm of which is provided with a pin 37 fitting in slot 34 of plate 23. Bell crank lever 35 is provided at the angle thereof with an irregular

aperture in which is received a similarly shaped portion 38 formed on a bearing member 39, as shown in Figs. 4 and 5, whereby relative rotary movement of bell crank 35 and member 39 is prevented. Bearing member 39 has a preferably left handed screw threaded connection with the interior of the hollow bearing piece or collar 32 secured to support 11 and serves as a pivotal mounting for bell crank 35. Member 39 is provided with an opening therethrough, the major portion of which is screw threaded and the inner portion of which is formed with an enlargement 40 having a smooth bore. Reference character 41 represents a screw engaging the threaded portion of the opening through member 39 and extending into the enlarged portion 40. Screw 41 is provided with a reduced portion 42 at its inner end, on which is loosely mounted a cylindrical cap 43 which fits closely in the enlarged portion 40 of the opening through member 39. Bell crank lever 35 is suitably secured on member 39 against a flange 44 formed on the latter, as by means of washer 45 and nut 46 on screw 41. Support 11 is provided with a recess 47 of sufficient size to permit members 32 and 43 to be positioned as shown in Fig. 3 in assembling the shaving device.

Obviously the turning of bell crank lever 35 will, by reason of the screw threaded connection between the fixed hollow bearing piece 32 and member 39, result in a movement of translation of parts 35, 39, 41 and 43 toward or from the shaving knife, according to whether lever 35 is turned to the left or the right. Portion 34' of slot 34 is so shaped that any movement of pin 37 therein will exert a cam action on plate 23 to cause sliding movement thereof on support 11, while portion 34' of slot 34 is formed on an arc which, when the pin 37 is in engagement therewith, is concentric with the pivotal axis of bell crank 35, whereby movement of pin 37 in this portion of slot 34 will cause no movement of plate 23.

The operation may be briefly described as follows: With the parts shown in the position of Fig. 1, on turning bell crank 35 to the left, pin 37 will exert, by means of its engagement with portion 34' of slot 34, a cam action on member 23 to slide the latter on support 11 against the action of spring 25. This movement of member 23 causes rod 20, by reason of its connection with the shaving knife, to move the latter to a position in which the cutting tool 17 thereof engages the record 3. As soon as the cutting tool engages the record, further movement of the bell crank 35 to the left and thereby of member 23 and rod 20 toward the record will tend to project the cutting tool into the record material. The resistance offered by the record material to the projection of the

cutting tool thereinto, however, will cause relative movement of rod 20 and the shaving knife and thereby the compression of spring 19, with the result that by the time pin 37 5 has reached the end of portion 34'' of slot 34 the cutting tool will be projected into the record material only a short distance and a distance proper for securing the desired cut. Spring 19 is made comparatively long 10 and quite weak, and the distance the cutting tool will be projected into any record for which the machine is adapted will, therefore, be substantially uniform regardless of the thickness of the record. When the pin 15 37 is at the end of portion 34'' of slot 34, the upper ends of slots 28 and 29 of member 23 will be in engagement with screw 30 and collar 32 respectively, and further sliding movement of member 23 toward the 20 record will be prevented. As lever 35 is turned still farther to the left, pin 37 will enter portion 34' of slot 34, and as this portion 34' will then be concentric with the pivotal axis of the bell crank, the continued 25 movement of the bell crank to the left will merely act to effect the locking of the shaving knife in operative position. The locking of the knife results from the movement of translation imparted to members 39, 41 30 and 43 on pivotal movement of the bell crank lever 35 by reason of the screw threaded connection between member 39, secured to the bell crank, and the fixed collar 32, screw 41 being so adjusted in member 39 that cap 35 43 will be forced into locking engagement with bar 15 of the shaving knife only during the latter part of the movement of the bell crank in portion 34' of slot 34. When 40 pin 37 has reached the lower end of slot 34, cap 43 will have been moved to such a position as to lock the bar 15 firmly against projection 12 of the carriage 4. It will also be apparent, from an inspection of Fig. 2, that when pin 37 is at the lower end of slot 45 34 it will also be below the dead center position determined by a line through the end of the cutting tool 17 and the pivotal axis of the bell crank lever 35, whereby the parts will be locked against displacement in the positions shown in this figure. The turning 50 of bell crank 35 to the right, from the position shown in Fig. 2, will first effect the movement of member 39 away from bar 15 of the shaving knife and thereby the release of the latter, whereupon spring 25, as soon as pin 37 is moved above dead-center position and has entered portion 34'' of slot 34, will quickly act to automatically effect the return of the parts to the positions 55 shown in Fig. 1 and thereby the withdrawal of the shaving knife from operative position.

It will be obvious that support 11 together with the shaving knife and the mechanism carried by support 11 for effecting 60

and controlling the movements of the shaving knife and the locking of the same in operative position, may be made as an attachment, which may be readily applied to shaving machines now in use or to phonographs to adapt the same for shaving 70 records.

While I have specifically described the preferred form of my invention, it is to be understood that the invention is not limited 75 to this form but may be embodied in numerous other forms without any departure from the spirit of my invention and the scope of the appended claims.

Having now described my invention, what I claim as new and desire to protect by Letters Patent is as follows:— 80

1. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding 85 movement, of a shaving device movably mounted on said carriage, and means having a positive connection with said device whereby a single manipulation of said means will first effect the positive movement 90 of said device into operative position, said means being adapted by the continuation of said manipulation to thereafter effect the locking of the shaving device in such position, substantially as described. 95

2. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding movement, of a shaving device movably 100 mounted on said carriage, and means having a yieldable connection with the shaving device and adapted by a single manipulation to first effect the movement of said device into operative position and to thereafter effect the locking of the same in such 105 position, substantially as described.

3. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding movement, of a shaving device movably 110 mounted on said carriage, means adapted by a single manipulation to first effect the movement of said device into operative position and to thereafter effect the locking of the same in such position, and means constantly tending to force the shaving device 115 to inoperative position, substantially as described.

4. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative 120 feeding movement, of a shaving device movably mounted on said carriage, a slidably mounted member having a resilient connection with the shaving device, means cooperating with said member and adapted by a single manipulation to first effect movement 125 of said device into operative position and to thereafter effect the locking of the same in such position, and means cooperating with 130

said member constantly tending to force the shaving device into inoperative position, substantially as described.

5 5. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding movement, of a shaving knife movably mounted on said carriage, mechanism
10 having a positive connection with said knife whereby the manipulation of said mechanism is adapted to effect the positive movement of said knife into operative position, and means actuatable by said mechanism for
15 locking said knife in operative position, substantially as described.

6. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding movement, of a shaving knife mounted on
20 said carriage, and means movable to effect the positive movement of said knife into operative position and for controlling the movement of said knife to inoperative position, said means having a resilient positive
25 connection with said knife, substantially as described.

7. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding
30 movement, of a member removably secured to said carriage, a shaving knife movably mounted on said member, and means mounted on said member and having a resilient positive connection with said shaving knife
35 whereby said means is operable to effect the positive movement of said knife into operative position, substantially as described.

8. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative
40 feeding movement, of a shaving knife movably mounted on said carriage, means for controlling the movement of said knife into and out of operative position, said controlling means having a resilient connection
45 with said knife, and means actuated by said controlling means for locking said knife in operative position, substantially as described.

50 9. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding movement, a shaving knife movably mounted on said carriage, mechanism mounted
55 on said carriage and having a positive connection with said knife whereby said mechanism is operable to effect the positive movement of said knife into operative position, said mechanism being operable to lock
60 the knife in operative position and also being operable to release said knife, and means for automatically moving said knife to inoperative position upon the release thereof, substantially as described.

65 10. In a machine for shaving sound records,

the combination with a record support and a carriage adapted for relative feeding movement, of a member removably secured to said carriage, a shaving knife
70 slidably mounted on said member, means mounted on said member for effecting the movement of said knife into operative position, means actuatable by said last named means for locking said knife in operative
75 position, and means constantly tending to force said knife into inoperative position, substantially as described.

11. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding
80 movement, of a shaving knife movably mounted on said carriage, a member resiliently connected with said shaving knife, and a pivoted member which, when moved in one direction, first exerts a cam action on
85 said first member to move said knife to operative position and thereafter effects the locking of said knife to said carriage in such position, substantially as described.

12. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative
90 feeding movement, of a shaving knife movably mounted on said carriage, and means comprising a pivoted member having a positive connection with said knife whereby it is adapted, during part of its movement in
95 one direction, to effect the positive movement of said knife to operative position, and means actuated by the pivotal movement of said member for locking the shaving knife in such position, substantially as described.
100

13. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding
105 movement, of a shaving knife movably mounted on said carriage, and means comprising a pivoted member having a positive connection with said knife whereby it is adapted, during part of its movement in
110 one direction, to effect the positive movement of said knife to operative position, and means adjustably connected with said member and actuated by the pivotal movement thereof for locking the shaving knife in operative position, substantially as described.
115

14. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding
120 movement, of a shaving knife movably mounted on said carriage, a member connected with said knife and provided with a cam surface, and a pivoted member, which, during movement in one direction first contacts with said cam surface to effect movement of said knife to operative position and thereafter effects the locking of said knife in such position, substantially as described.
125

15. In a machine for shaving sound records, the combination with a record support
130

and a carriage adapted for relative feeding movement, of a shaving knife movably mounted on said carriage, a member resiliently connected with said knife and provided with a cam surface, a pivoted member which, during movement in one direction, coacts with said cam surface to effect movement of said knife to operative position, and means actuated by the pivotal movement of said pivoted member for locking said knife in operative position, substantially as described.

16. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding movement, of a shaving knife movably mounted on said carriage, means comprising a pivoted member for controlling the movement of the knife into and out of operative position, said pivoted member being provided with a pivotal bearing member having a screw threaded engagement with a fixed part of the machine, and means adjustably connected with said bearing member and adapted to effect the locking of said knife in operative position upon pivotal movement of said controlling member, substantially as described.

17. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding movement, of a shaving knife movably mounted on said carriage, mechanism having a connection with said knife for effecting the positive movement of the latter into operative position, and means comprising a member adjustably connected with said mechanism and actuable thereby for effecting the locking of the knife in operative position, substantially as described.

18. An attachment for shaving machines comprising a support, a shaving knife movably mounted on said support, and means movable on said support and having a positive connection with said knife whereby it is adapted, when moved in one direction, to first effect positive movement of said knife relative to said support, the continued movement of said means in said direction being adapted to thereafter effect the locking of said knife in the position to which it has been moved, substantially as described.

19. An attachment for shaving machines comprising a support, a shaving knife movably mounted on said support, and means movable on said support and having an adjustable and resilient connection with said knife, said means adapted when moved in one direction to first effect movement of said knife relative to said support and to thereafter effect the locking of said knife in the position to which it has been moved, substantially as described.

20. An attachment for shaving machines comprising a support, a shaving knife mov-

ably mounted on said support, means movable on said support and adapted when moved in one direction to first effect movement of said knife relative to said support and to thereafter effect the locking of said knife in the position to which it has been moved, and means constantly tending to oppose such movement of the knife by said first named means, substantially as described.

21. An attachment for shaving machines comprising a support, a shaving knife movably mounted on said support, and controlling means for said knife comprising a device positively connected to said knife and movably mounted on said support and an actuating member pivotally mounted on said support and positively connected to said device, whereby said actuating member is adapted, when turned in one direction, to first effect positive movement of said device and thereby positive movement of said knife, the continued movement of said member in said direction being adapted to thereafter effect the locking of said knife in the position to which it has been moved, substantially as described.

22. An attachment for shaving machines comprising a support, a shaving knife movably mounted on said support, and controlling means for said knife comprising a device having a positive connection with said knife and movably mounted on said support and an actuating member pivotally mounted on said support and having a positive connection with said device, whereby said actuating member is adapted when moved in one direction to first exert a cam action on said device to thereby cause the latter to positively move said knife relative to said support, the continued movement of said member in said direction being adapted to thereafter effect the locking of said knife in the position to which it has been moved, substantially as described.

23. An attachment for shaving machines comprising a support, a shaving knife movably mounted on said support, and an actuating member provided with a pivotal bearing portion having a screw threaded connection with said support, whereby pivotal movement of said member results in a movement of translation thereof, said actuating member having a positive connection with said knife whereby it is adapted, when turned in one direction, to first effect positive movement of said knife relative to said support and to thereafter cause by its movement of translation the locking of said knife in the position to which it has been moved, substantially as described.

24. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding movement, of a shaving device movably mounted on said carriage, and means

having a positive adjustable connection with the shaving device and adapted by a single manipulation to first effect the positive movement of said device into operative position and to thereafter effect the locking of the same in such position, substantially as described.

25. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding movement, of a shaving knife movably mounted on said carriage, mechanism having a positive adjustable connection with said knife whereby manipulation of said mechanism will effect the positive movement of said knife into operative position, and means actuatable by said mechanism for locking said knife in operative position, substantially as described.

26. In a machine for shaving sound records, the combination with a record support and a carriage adapted for relative feeding movement, of a shaving knife mounted on said carriage for movement toward and from said support, and means separate from the mounting of said knife and operative to effect the positive movement of said knife into operative position and for controlling the movement of said knife to inoperative position, said means having an adjustable positive connection with said knife whereby the latter may be adjusted with respect to said means toward and from said support and secured to said means in adjusted position, substantially as described.

27. In a machine for shaving sound rec-

ords, the combination with a record support and a carriage adapted for relative feeding movement, of a shaving knife movably mounted on said carriage, and means comprising a movable member having a positive connection with said knife whereby the said member, when moved in one direction, first exerts a cam action to effect the positive movement of said knife into operative position, and thereafter effects the locking of said knife in such position, substantially as described.

28. An attachment for shaving machines comprising a support, a shaving knife movably mounted on said support, an actuating member provided with a pivotal bearing portion having a screw threaded connection with said support whereby pivotal movement of said member results in a movement of translation thereof, and locking means for said knife adjustably connected with said bearing portion, said actuating member having a positive connection with said knife whereby it is adapted, when turned in one direction, to first effect positive movement of said knife relative to said support and to thereafter cause by its movement of translation the locking engagement of said locking means and said knife, substantially as described.

This specification signed and witnessed this 19th day of June, 1913.

CHARLES SCHIFFL.

Witnesses:

WILLIAM A. HARDY,
MARY J. LAIDLAW.

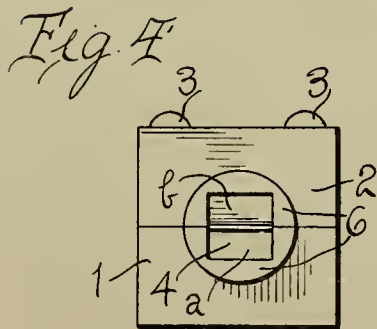
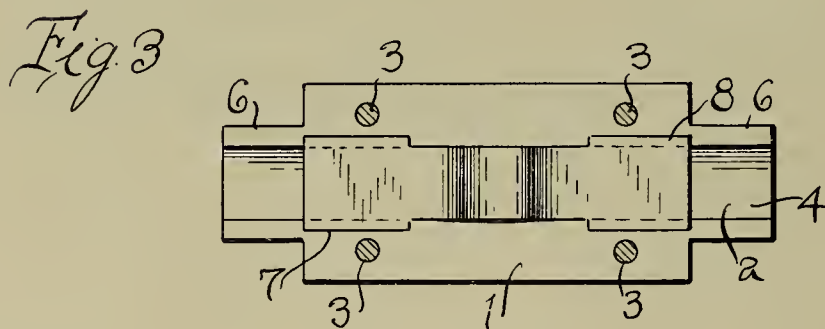
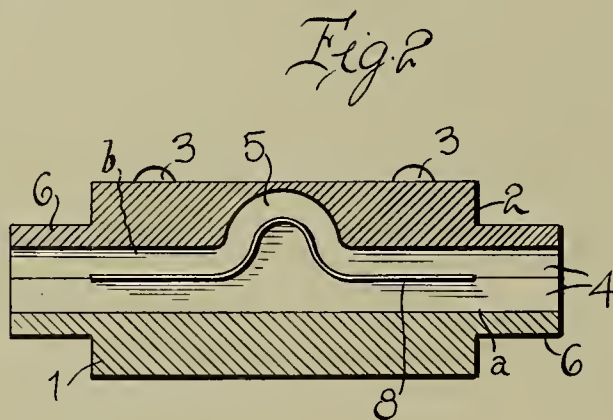
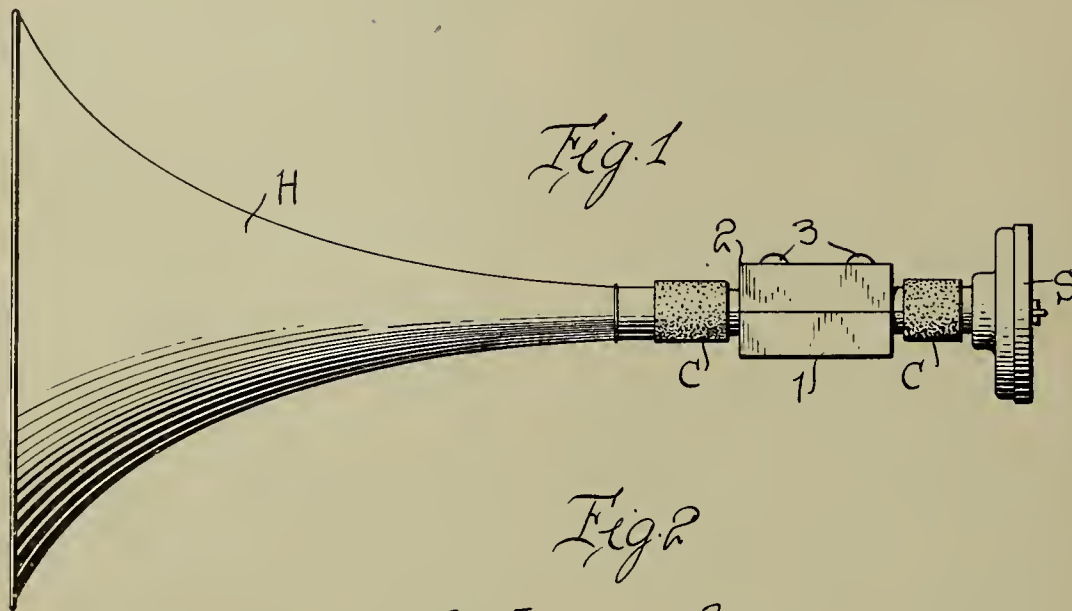
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

AMPLIFYING DEVICE,
1,174,358-----H. A. J. Sexton,
Patented-March 7th, 1916.
Filed-July3rd, 1915.

H. A. J. SEXTON.
 AMPLIFYING DEVICE.
 APPLICATION FILED JULY 3, 1915.

1,174,358.

Patented Mar. 7, 1916.



Inventor

H. A. J. SEXTON

By *Watson E. Coleman*

Attorney

UNITED STATES PATENT OFFICE.

HENRY A. J. SEXTON, OF ST. LOUIS, MISSOURI.

AMPLIFYING DEVICE.

1,174,358.

Specification of Letters Patent.

Patented Mar. 7, 1916.

Application filed July 3, 1915. Serial No. 37,901.

To all whom it may concern:

Be it known that I, HENRY A. J. SEXTON, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Amplifying Devices, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to certain improvements in amplifying devices; and it is an object of the invention to provide a device of this general character adapted to be interposed between the sound reproducing member and the sound chamber for increasing the volume of the sound and also enhancing the quality of the tones.

Furthermore, it is an object of the invention to provide a novel and improved device of this general character whereby the sound as emitted from the reproducing member is caused to travel in separated paths discharging at substantially a common point.

Furthermore, it is an object of the invention to provide a novel and improved device whereby obstruction is offered to the sound as it passes through the device.

The invention consists in the details of construction and in the combination and arrangement of the several parts of my improved amplifying device whereby certain important advantages are attained and the device is rendered simpler, less expensive and otherwise more convenient and advantageous for use, all as will be hereinafter more fully set forth.

The novel features of the invention will be carefully defined in the appended claims.

In order that my invention may be the better understood, I will now proceed to describe the same with reference to the accompanying drawings, wherein—

Figure 1 is a view in elevation of a somewhat diagrammatic character, illustrating an amplifier constructed in accordance with an embodiment of my invention in applied position; Fig. 2 is an enlarged longitudinal sectional view, detached, taken through my improved amplifier as herein embodied; Fig. 3 is a view in top plan of the lower section of my device as herein disclosed, with the connecting members in section and the interposed spring in plan; and Fig. 4 is an end elevational view of the amplifier as herein set forth.

As disclosed in the accompanying draw-

ings, S denotes a sound box and H denotes a horn or other sound chamber in communication one with the other through the medium of the conduit C preferably of flexible tubing. Interposed in the conduit C is my improved amplifying device which comprises the superimposed sections 1 and 2 of suitable material and maintained in operative assemblage through the medium of the fastening devices 3, herein disclosed as threaded bolts.

The opposed faces of the sections 1 and 2 are grooved to afford the bore 4, the groove within the upper section 2 being depressed, as at 5, at a point substantially at the longitudinal center of the section. The sections when assembled are provided at their opposite ends with the flanges 6 affording nipples whereby the requisite connection may be had with the conduit C. The bore 4 is divided into two channels *a* and *b* through the medium of the interposed spring 8, the extremities of which are enlarged transversely, as at 7, to afford wings adapted to be interposed between the sections 1 and 2 whereby said spring may be maintained in applied position, the intermediate portion of the spring being curved to conform to the bottom wall of the groove of the upper section 2.

From the foregoing description, it is thought to be obvious that an amplifying device constructed in accordance with my invention is of an extremely simple and comparatively inexpensive nature and is particularly well adapted for use by reason of the convenience and facility with which it may be assembled, and it will also be obvious that my invention is susceptible of some change and modification without material departure from the scope of the appended claims and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice.

I claim:

1. A sound amplifier including a body provided with a bore therethrough, and means for dividing said bore into separate channels providing irregular paths, a wall of said bore being depressed at a point intermediate of its length.

2. A sound amplifier comprising two sections, means for maintaining said sections in superimposed relation, the opposed faces

of said sections being grooved to afford a bore, and means for dividing said bore into separate channels.

5 3. A sound amplifier comprising two sections, means for maintaining said sections in superimposed relation, the opposed faces of said sections being grooved to afford a bore, and means for dividing said bore into separate channels, an intermediate portion
10 of one of the grooves being depressed.

4. A sound amplifier including a body provided with a bore, and a spring member dividing said bore into separate channels, the extremities of the spring being secured
15 to the member.

5. A sound amplifier including a body provided with a bore, and a spring member dividing said bore into separate channels, the extremities of the spring being secured
20 to the member, the wall of one of the channels being depressed, the spring having its intermediate portion disposed within said depression.

6. A sound amplifier comprising two sec-

tions, means for maintaining said sections 25 in superposed relation, the opposed faces of said sections being grooved to afford a bore, and a spring member dividing said bore into separate channels, the extremities of the spring being provided with laterally dis- 30 posed wings positioned between the sections whereby said spring is maintained in applied position.

7. A sound amplifier comprising two sections, means for maintaining said sections 35 in superposed relation, the opposed faces of said sections being grooved to afford a bore, and means for dividing said bore into separate channels, the intermediate portion of one of said grooves being depressed, the 40 second groove being straight and unobstructed throughout its length.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

HENRY A. J. SEXTON.

Witnesses:

EMIL C. SECKEL,

HENRY W. L. SEXTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

WINDING DEVICE FOR SPRING
MOTORS,

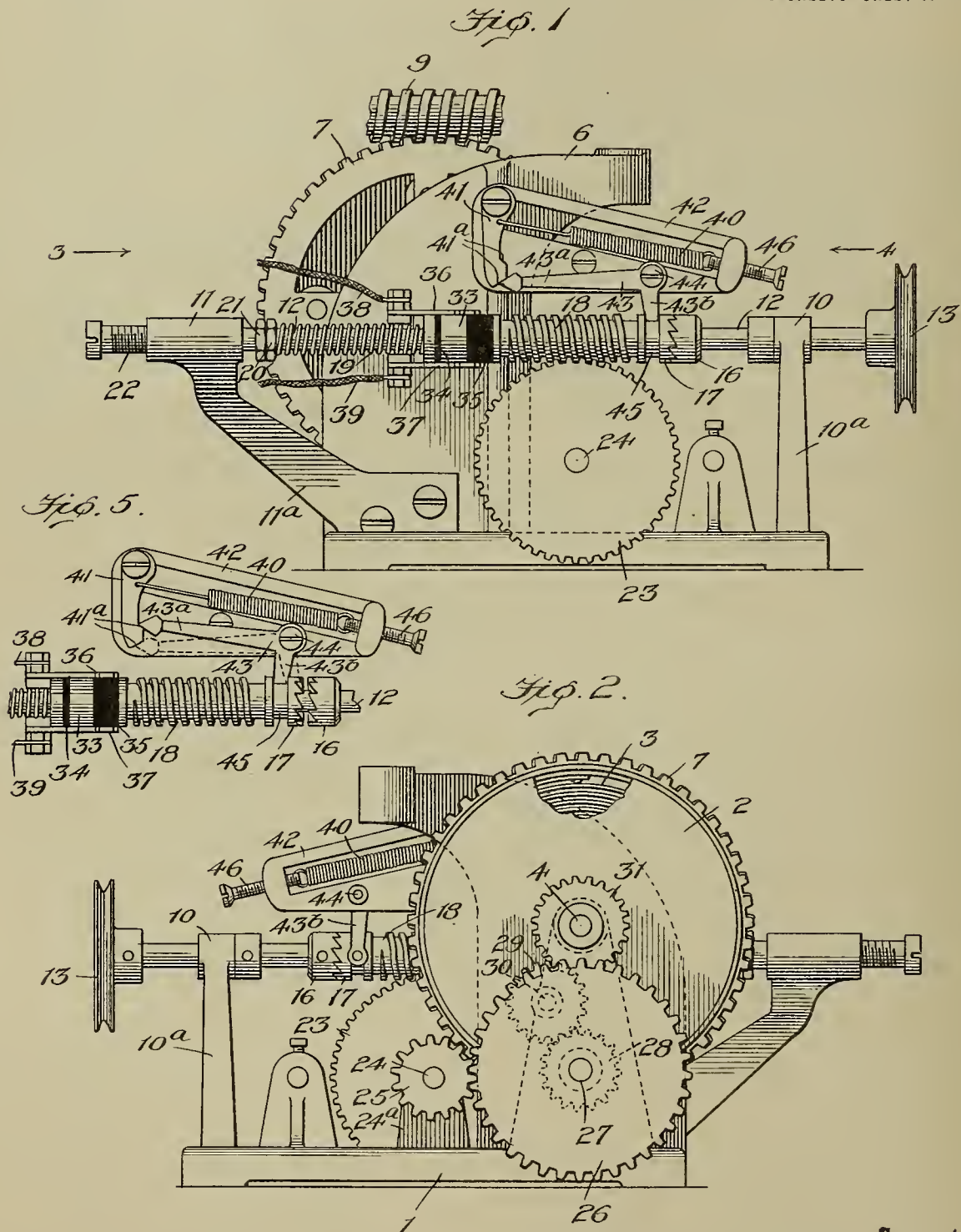
1,174,454-----E. E. Taliaferro,
Patented-March 7th, 1916.
Filed-November 6th, 1914.

E. E. TALIAFERRO.
WINDING DEVICE FOR SPRING MOTORS.
APPLICATION FILED NOV. 6, 1914.

1,174,454.

Patented Mar. 7, 1916.

2 SHEETS—SHEET 1.



Witnesses
M. S. Crandell
F. E. Ruth.

Inventor
Edward E. Taliaferro
By Church & Church
his Attorneys

E. E. TALIAFERRO.
WINDING DEVICE FOR SPRING MOTORS.
APPLICATION FILED NOV. 6, 1914.

1,174,454.

Patented Mar. 7, 1916.
2 SHEETS—SHEET 2.

Fig. 3.

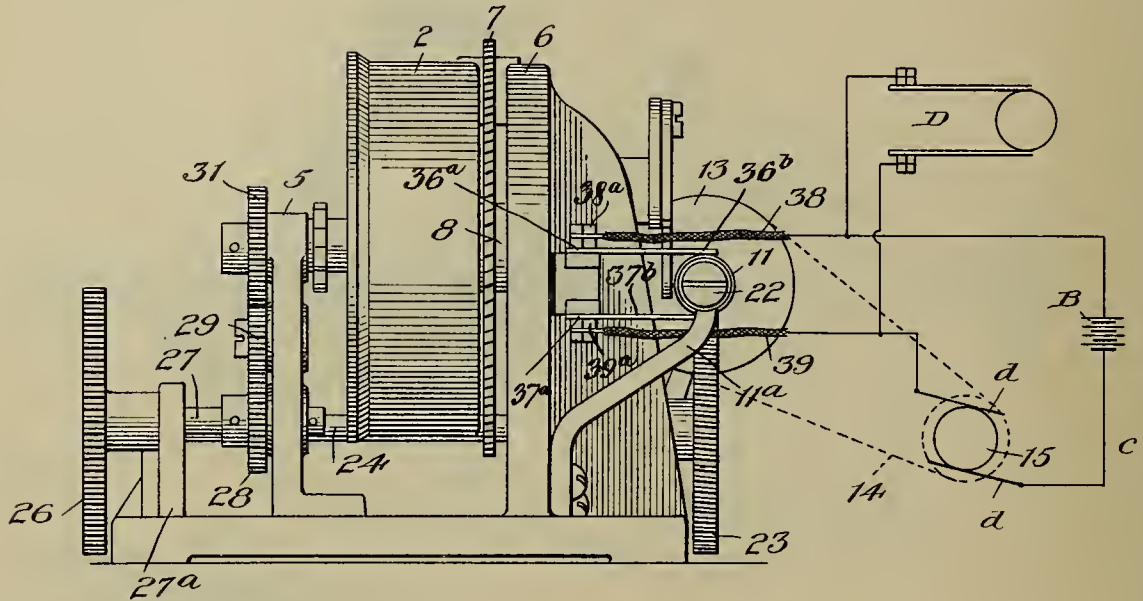
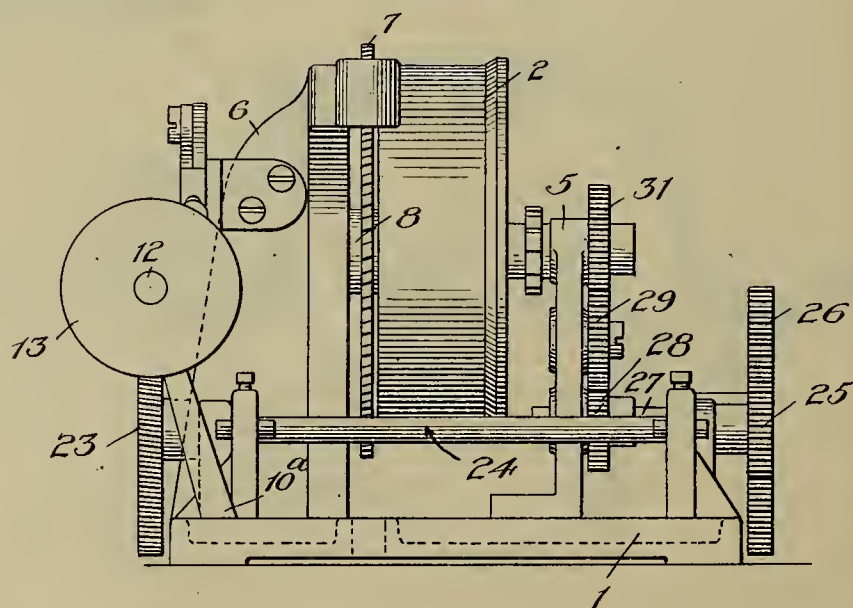


Fig. 4.



Witnesses
M. B. Crandell
F. E. Ruth.

Inventor
Edward E. Taliaferro
By Church & Church
his Attorneys

UNITED STATES PATENT OFFICE.

EDWARD E. TALIAFERRO, OF COLORADO SPRINGS, COLORADO.

WINDING DEVICE FOR SPRING-MOTORS.

1,174,454.

Specification of Letters Patent.

Patented Mar. 7, 1916.

Application filed November 6, 1914. Serial No. 870,618.

To all whom it may concern:

Be it known that I, EDWARD E. TALIAFERRO, a citizen of the United States, residing at Colorado Springs, in the county of El Paso and State of Colorado, have invented certain new and useful Improvements in Winding Devices for Spring-Motors; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the figures and letters of reference marked thereon.

This invention relates to devices for winding motors, and particularly to a novel arrangement for automatically winding the spring of a spring motor, as the spring becomes unwound and the tension decreased.

Among the objects of the present invention, is the provision of means for automatically throwing the winding device into and out of connection with the motor, such means being responsive to variations in tension of the motor spring. The relation between the winding device and the motor spring is such that when the tension of the spring becomes feeble, due to continued revolution of the motor, the winding device is automatically thrown into engagement to rewind the spring. The operation of throwing the winding device into engagement with the motor to rewind it, is effected by spring actuated mechanism, the normal tension of which is greater than the unwound motor spring but less than the wound spring, the motor spring and the mechanism for throwing the winding device being so related that until the motor spring has reached a low tension, the said mechanism remains inoperative. When, however, the tension of the motor spring has decreased to that point where its tension is overbalanced by the spring actuated mechanism, the winding device is quickly thrown into engagement with the motor to rewind it and remains in engagement until the tension of the spring in the motor is sufficiently high to overbalance the pressure of the spring actuated mechanism and throw the winding device out of engagement. In other words, according to this invention the operation of connecting and disconnecting the winding device is controlled primarily by the tension in the motor spring itself.

The invention also provides means for

adjusting the degree of tension variation between the motor spring and the spring actuated mechanism for throwing the winding device in order to properly determine the exact periods during the operation of the spring motor when the connection and disconnection of the winding device shall take place. In this way a very fine adjustment of the tension of the opposing springs may be attained, and, in addition, it is possible to determine the exact degree of difference in the tension of said springs necessary to effect throwing of the winding device.

The arrangement of the parts controlling the operation of the winding device is such that it will be quickly thrown into and out of engagement with the motor with a spring-like motion and held in positive locking engagement when the motor spring is being wound, and at the same time the winding device will be maintained in positive disengagement after winding of the spring and before such a low tension of the motor spring has been reached as to again bring the parts into locking engagement.

A full understanding of the invention will be obtained from the following detailed description, taken in connection with the accompanying drawings illustrating a construction embodying the same in a preferred form and specifically pointed out in the appended claims.

In the drawings: Figure 1 is a side elevation of a portion of a spring motor of the type usually employed in talking machines or phonographs, equipped with the improved winding device; Fig. 2 is a side elevation looking in the opposite direction from Fig. 1; Fig. 3 is an end elevation looking in the direction of the arrow 3 in Fig. 1; Fig. 4 is an end elevation looking in the direction of the arrow 4 in Fig. 1; and Fig. 5 is a fragmentary detail view of the tension regulating mechanism showing the position of the parts when the winding device is disconnected from the motor, the intermediate position of the parts being indicated by dotted lines.

For convenience in describing the invention I have shown the improved winding device used in connection with a spring motor of the type usually employed in talking machines or phonographs, the invention be-

ing particularly applicable for use with such a motor. It will be understood, however, that the showing of a spring motor of the type referred to is merely for purposes of illustration and the invention is not to be in any way limited thereto, for the reason that it will be found equally useful with motors of other types, and for different purposes as well.

As shown in the drawings, the spring motor and the winding device are mounted on a base plate 1, the spring motor having the usual drum 2, containing a spring 3. The drum 2 is mounted on a shaft 4 (see Fig. 2) journaled in bearings in fixed uprights 5 and 6 which are supported by the base plate 1, and the spring 3 is adapted to revolve a worm gear 7, mounted on a collar 8 on the shaft 4, the worm gear 7 meshing with a worm 9 for the purpose of driving the record disk or cylinder and other parts, in a manner well known in the art.

Mounted to revolve in bearings 10 and 11, carried by suitable supports 10^a and 11^a, is a shaft 12. This shaft has fixed thereto at one end a sheave 13 adapted to carry a belt 14 which passes over the driving pulley of a motor 15, as indicated diagrammatically in Fig. 3. The shaft 12 has also fixed thereto a clutch member 16 and is also provided with a slidable clutch member 17 carried at one end of a sliding cylindrical worm 18 mounted on the shaft. The worm 18 and its clutch member 17 is pressed into engagement with the fixed clutch member 16 at the proper moment by the tension of a spring 19 encircling shaft 12. Means for adjusting the tension of the spring 19 is provided, consisting of an adjusting nut 20 and a locking nut 21 for maintaining the spring in its position of adjustment. The shaft 12 may be adjusted longitudinally by means of a set screw 22 in the bearing 11. The worm 18 meshes with and is adapted to drive a worm gear 23 mounted on a shaft 24 when the clutch members 16 and 17 are in engagement and the shaft 12 is rotated. The shaft 24, which is journaled in suitable bearings, mounted on supports 24^a, is also provided with a small gear 25 meshing with a gear 26 mounted on a shaft 27 journaled in a bearing 27^a and also in the upright 5. The shaft 27 also rotates a gear 28 meshing with a gear 29 on a shaft 30 mounted to rotate in the fixed upright 5. The gear 29 in turn drives a gear 31 on the main driving shaft 4, to rewind the motor spring 3 when the two clutch members 16 and 17 are in engagement and the worm 18 is rotated by the shaft 12. When the two clutch members are in engagement the shaft 12 is adapted to be driven to rewind the motor spring 3 by means of the electric motor 15. Hence it is desirable that the circuit of said motor be closed at the same time as the locking engagement of the

two clutch members. This is accomplished as follows: The worm 18 is provided with a contact ring 33 insulated from the worm by means of insulating rings 34 and 35. The contact ring 33 is adapted to close the electric motor circuit when in engagement with contact members 36 and 37 from which lead the line wires 38 and 39. Contact members 36 and 37 are substantially L-shaped, having arms 36^a and 37^a fixed to terminals 38^a, 39^a, and angular arms 36^b, 37^b, which engage the contact and insulating rings respectively as the worm 18 is moved on shaft 12. As indicated diagrammatically in Fig. 3, the line wire 38 leads to one pole of generator B, the wire *c* leading from the other pole to one of the motor brushes *d*; the other line wire 39 is connected to the other motor brush. It will thus be apparent that, when the contact ring 33 is pressed into engagement with the contact members 36 and 37, the circuit will be completed through line wire 38, battery B, wire *c*, motor brushes *d* and motor 15, line wire 39, contact member 37, ring 33, contact member 36, line wire 38 and back to generator. Closing the circuit in this manner, sets in motion the electric motor 15 which at the same time is operatively connected to the spring motor by the engagement of the clutch members 16 and 17. Rotation of the electric motor revolves the shaft 12, and with it the worm 18, and the train of gears connecting the worm to the drum 2 to wind the spring 3. Continued winding of the spring 3 increases its tension, and when a degree of tension in the spring 3 in excess of the spring 19 controlling the clutch member 17 has been reached, the greater tension of the motor spring 3 overbalances the tension of the spring 19 in such manner as to slide the worm 18 and clutch member 17 on the shaft 12 away from the clutch member 16, thus disconnecting the electric motor. At the same time, the insulating ring 35 is shifted into a position of contact with the contact members 36, 37, opening the circuit of the motor 15. The tension of the motor spring 3 is transmitted through the train of intermediary gears to the worm 18 and opposes the pressure of the spring 19, causing the worm to move axially and disconnect the clutch and electrical contacts.

The basic principle upon which the clutch members are thrown into and out of engagement with each other is the variation in tension between the spring motor and the clutch shifting means. The spring 19 is preferably of such strength that its normal tension is greater than the unwound motor spring but less than the wound motor spring. It will thus be seen that until the tension of the motor spring is weakened to a certain extent by the operation of the spring motor its pressure will overbalance the pressure of the

spring 19, and keep the clutch members 16 and 17 separated during which the winding motor will be disconnected. The moment, however, the tension of the main motor spring has weakened to an extent that it is overbalanced by the tension of the spring 19, connection of the winding motor takes place and the winding operation begins. In this manner, the spring motor is kept continuously wound, the connection and disconnection of the winding device being controlled primarily by variations in tension in the spring motor itself.

The invention also provides means for adjusting the variation in tension between the two springs in such manner that the periods during the operation of the motor at which the connection and disconnection of the winding device takes place may be positively determined. This adjustment is attained by means of a supplementary spring 40 having one end secured to a locking dog 41 pivoted to a plate 42 which is secured to the upright 6. The lower end of the dog 41 is provided with inclined shoulders 41^a either of which may be engaged by the horizontal member 43^a of a trip arm 43 is pivoted at 44 to the plate 42, the vertical member 43^b of the trip arm entering a groove 45 in the worm 18. The tension of the spring 40 is such that its pull upon the dog 41 is adapted to retain the horizontal member 43^a in engagement with either side of the shoulder 41^a, depending upon the direction of pressure upon the worm 18. When the tension of the spring 19 is greater than the motor spring 3 it will exert its pressure on the worm 18 to lock the clutch members. This pressure will move the vertical member 43^b and the horizontal member 43^a of the trip arm 43 into reverse position indicated by dotted lines in Fig. 5. It will be apparent that the pull of the spring 40 will unite with the pressure of the spring 19 to snap the member 43^a into the position shown in Fig. 1. This snapping or spring-like action will be transmitted to the worm 18 through the vertical member 43^b, thus causing the clutch member 17 to slip quickly into positive engagement with the clutch member 16. Obviously, the spring 40 will exert the same snapping action in the opposite direction, or in other words, when the spring 19 is overbalanced by the wound motor spring 3. Thus, the spring 40 with its accompanying parts is equally effective in assisting both the motor spring 3 and the spring 19 to shift the worm in either direction, effecting the same quick connection and disconnection of the winding device. Adjustment of the tension or pull of the spring 40 is effected by means of a set screw 46 to which one end of the spring is secured, said set

screw being threaded in the plate 42. By adjusting the spring 40 and the spring 19 through the adjustment nuts 20 and 21, and also the set screw 22, the exact degree of differences between the tension of the clutch shifting device and the motor spring 3 may be fixed. In other words, by the use of the adjustable feature of this invention, it is possible to determine exactly the amount of tension variation necessary for throwing the clutches, so that, the device may be adjusted to connect or disconnect the winding motor at predetermined amounts of tension variation between the motor spring and the mechanism for operating the clutches. When the worm is unclutched from the shaft and ceases to rotate the shaft is entirely free for winding any other springs which may be connected with it, as hereinafter explained. As the spring motor runs by the tension of the wound spring 3, it will be obvious that the tension will gradually grow weaker until it is below that of the spring 19. When the degree of variation has been reached the worm 18 will be shifted forward on the shaft 12, connecting the clutches and closing the motor circuit to again wind the spring 3.

The invention will be found very valuable in winding all sorts of spring motors and its operation has not only been found entirely satisfactory in winding a single train of wheels driven by a single spring, but it is equally satisfactory in driving any number of trains with independent springs from a single motor and a single shaft. For instance, in winding a clock having two trains of wheels, one for time keeping purposes and the other for operating the striker or chime, the separate trains may be connected to a single motor by the use of an auxiliary circuit D connected in shunt across the main circuit (as shown in Fig. 3). Obviously, such an arrangement may be multiplied at will and with equal success, the single motor winding the several trains of wheels independently. The shaft 12 being independent of the spring motor when the motor is not winding, it is obvious that other springs may be wound by the same shaft without interference by simply connecting other worms and gear trains in the manner previously described.

While I have shown and described a certain specific embodiment of my invention and a particular application thereof it will be understood that the same is not to be limited in any way to details of construction nor to any particular use, but on the contrary is capable of considerable variation and modification within the scope of the claims.

What I claim is,—

1. In a winding device for spring motors,

the combination of an electric motor, a clutch for connecting the electric motor with the spring motor, and means responsive to variations in tension of the spring in the spring motor for operating said clutch, and opening and closing the circuit of said electric motor.

2. In a winding device for continuously running spring motors, the combination of a device operative to wind the motor when the force of the motor spring is almost spent, and spring actuated mechanism adapted to be controlled by variations in tension for connecting and disconnecting said winding device.

3. In a winding device for continuously running spring motors, the combination of a device operative to wind the motor when the force of the motor spring is almost spent, a spring actuated clutch for connecting and disconnecting said winding device, and means controlled by variations in tension of the spring in the motor for actuating said clutch to connect and disconnect said winding device.

4. In a winding device for spring motors, the combination of an electric motor for winding the spring motor, a spring actuated clutch for connecting and disconnecting the electric motor, circuit connections adapted to be controlled simultaneously by said clutch, and means controlled by variations in tension of the spring in the spring motor for actuating said clutch to connect and disconnect the electric motor and open and close its circuits.

5. In a self-winding continuously running spring motor, the combination of a winding device adapted to be connected thereto when the force of the motor spring is almost spent, a clutch for connecting and disconnecting said winding device, a spring controlling said clutch having a tension greater than the unwound motor spring but less than the wound motor spring whereby the connection and disconnection of the winding device is determined by variations in tension between the two springs, and means for adjusting said variations in tension to vary the periods during the operation of the motor when the connection and disconnection of the winding device takes place.

6. In a self-winding continuously running spring motor, the combination of an electric motor for winding the spring motor when the force of the motor spring is almost spent, a clutch for connecting and disconnecting the electric motor, circuit connections adapted to be controlled simultaneously by said clutch, a spring controlling said clutch having a tension greater than the unwound motor spring, but less than the wound motor spring whereby the con-

nection and disconnection of the electric motor is determined by variations in tension between the two springs, and means for adjusting said variations in tension to vary the periods during the operation of the spring motor when the connection and disconnection of the electric winding motor takes place.

7. The combination of a spring motor, an electric motor for winding the spring motor and adapted to be connected and disconnected therewith, circuit connections for the electric motor, and a spring actuated clutch responsive to a difference in tension between the clutch spring and the motor spring for automatically connecting the electric motor and simultaneously closing its circuit through said circuit connections when the spring motor has become unwound.

8. The combination of a spring motor, an electric motor for winding the spring motor and adapted to be connected and disconnected therewith, circuit connections for the electric motor and a spring actuated clutch for automatically connecting and disconnecting the electric motor and simultaneously closing and opening its circuit, the tension of the clutch spring being greater than the motor spring when the force of the motor spring is almost spent whereby the electric motor is connected, and less than the motor spring when wound, whereby the clutch spring is overbalanced upon winding of the motor and said electric motor is disconnected.

9. The combination of a spring motor, an electric motor for winding the spring motor and adapted to be connected and disconnected therewith, circuit connections for the electric motor, a spring actuated clutch for automatically connecting and disconnecting the electric motor and simultaneously closing and opening its circuit, the tension of the clutch spring being greater than the motor spring when the force of the motor spring is almost spent, whereby the electric motor is connected, and less than the motor spring when wound, whereby said clutch spring is overbalanced upon winding of the motor, and said electric motor is disconnected, and means for adjusting the tension of the clutch spring to vary the periods during the operation of the spring motor when the connection and disconnection of the electric winding motor takes place.

10. The combination of a spring motor, an electric motor for winding the spring motor and adapted to be connected and disconnected therewith, circuit connections for the electric motor, a spring actuated clutch for automatically connecting and disconnecting the electric motor and simultaneously closing and opening its circuit, the tension of the clutch spring being greater

than the motor spring when the force of the motor spring is almost spent, whereby the electric motor is connected, and less than the motor spring when wound, whereby said clutch spring is overbalanced upon winding of the motor, and said electric motor is disconnected, and means for imparting a spring action in either direction to said clutch to quickly engage and disengage said winding means and maintain the same in positive engaged and disengaged relation at the proper intervals during the operation of the spring motor.

EDWARD E. TALIAFERRO.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND BOX FOR PHONOGRAPHS,
1,174,996-----J. C. Kulp,
Patented-March 14th, 1916.
Filed-August 5th, 1915.

J. C. KULP.
SOUND BOX FOR PHONOGRAPHS.
APPLICATION FILED AUG. 5, 1915.

1,174,996.

Patented Mar. 14, 1916.

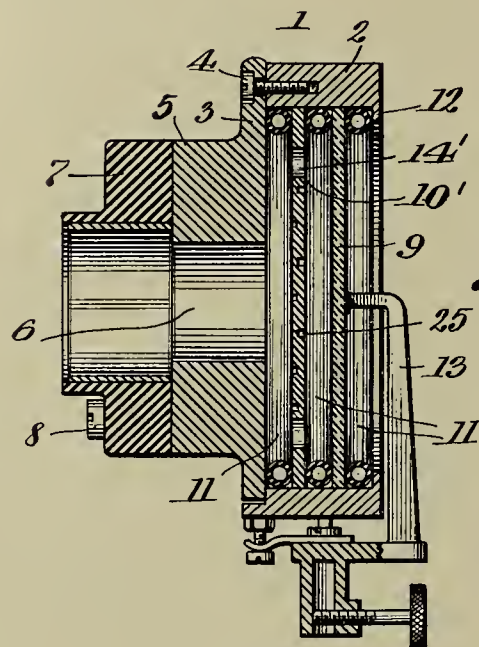


Fig. 1.

Fig. 3.

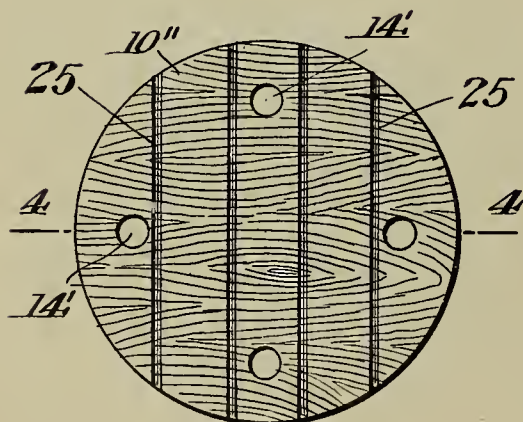


Fig. 2.

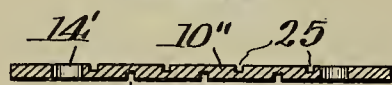
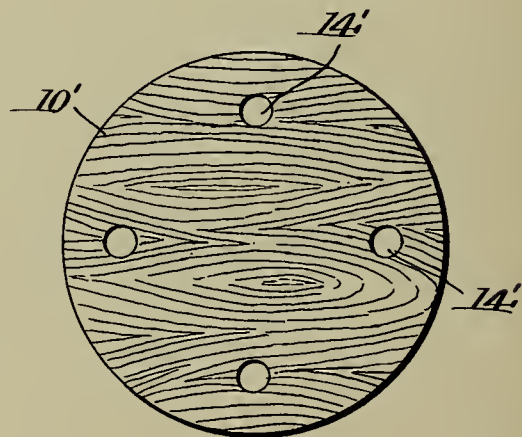


Fig. 4.

Inventor:

Joseph C. Kulp.

UNITED STATES PATENT OFFICE.

JOSEPH C. KULP, OF ATLANTIC HIGHLANDS, NEW JERSEY.

SOUND-BOX FOR PHONOGRAPHS.

1,174,996.

Specification of Letters Patent.

Patented Mar. 14, 1916.

Application filed August 5, 1915. Serial No. 43,748.

To all whom it may concern:

Be it known that I, JOSEPH C. KULP, a citizen of the United States, residing at Atlantic Highlands, in the county of Monmouth and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Phonographs, of which the following is a specification.

My invention relates to improvements in the vibratory members of the sound box of a phonograph, and more specifically to an auxiliary diaphragm, located between the usual diaphragm, and the outlet to the amplifier.

This invention is an improvement on the auxiliary diaphragm disclosed in my application Serial No. 37904 filed July 3, 1915.

One object of this invention is to provide an auxiliary diaphragm of such material and construction, as will produce a more musical and softer tone.

A second object is to provide such a diaphragm as will produce a tone, amplified to a greater degree than is possible by the use of the usual diaphragm alone.

A third object is to provide such a diaphragm, as will produce better enunciation than heretofore attained.

A fourth object is to produce a wooden diaphragm which will vibrate substantially as well across the grain of the wood as with the grain.

I attain these objects by the mechanism illustrated in the accompanying drawing, in which—

Figure 1 illustrates a sectional view through a phonograph sound box equipped with my auxiliary diaphragm. Fig. 2 illustrates a plan view of one form of my improved diaphragm. Fig. 3 illustrates a plan view of a modified form of my improved diaphragm, and Fig. 4 illustrates a sectional view along line 4—4 of Fig. 3.

In the several views of the drawing, the same reference characters represent the same parts.

The sound box illustrated in Fig. 1 comprises a cylindrical casing 1, comprising a rim section 2 and an end section 3, secured together by means of screws 4. The end section 3 is provided with a hub portion 5, and a central outlet 6. To the hub 5 is attached a rubber sleeve 7, by means of screws 8, the sleeve serving as a means of attachment to the usual amplifier (not shown).

Supported freely within the rim 2 of the casing is a diaphragm 9 of mica or any other well known material and a wooden diaphragm 10', retained in position by means of rubber gaskets 11, between the inner face of the end section 3 of the casing, and the inturned flange 12, of the rim 2. To the center of the diaphragm 9 is attached the stylus bar 13. The stylus bar is of the usual construction, and a detailed description thereof is considered unnecessary herein.

One form of the auxiliary wooden diaphragm 10', is illustrated in detail in Fig. 2. I preferably construct it as a thin wafer of close grained hard wood provided with a small number of small equally spaced openings 14' adjacent its periphery. When a smooth thin wafer of wood is employed, the wood must be thoroughly seasoned and by natural processes. Kiln dried wood fails to give as satisfactory results as naturally seasoned wood. The wood must be hard and close grained, cherry having been found the most satisfactory.

The holes 14', to give the best results must be as near the periphery of the diaphragm as possible and still have them uncovered when the said diaphragm is clamped within the casing 2 between the gaskets 11. Further the holes must be equally spaced and few in number, four having been found productive of the best results. Holes placed nearer the center of the diaphragm and more nearly in alinement with the outlet 6 in the casing, failed to reduce to an appreciable amount, the metallic tones produced by the mica diaphragm 9. The four holes as shown in Figs. 2 and 3 are generic to both modifications of my invention. Also these four holes in Figs. 2 and 3 were disclosed in my former application filed July 3, 1915, Serial No. 37,904.

Owing to the fact that the diaphragm, to vibrate freely, must be very thin, a great deal of difficulty has been experienced in obtaining wood sufficiently thin, and yet strong enough for the purpose. I have found that highly satisfactory results may be obtained, by constructing the diaphragm of thicker wood, and scoring it upon either side across the grain, as shown in Figs. 3 and 4. In these figures I have disclosed a wooden diaphragm 10'' provided with a plurality of holes 14' and scorings 25 running approxi-

mately at right angles to the grain on either side, those upon one side alternating with those upon the other side. A diaphragm, thus constructed, vibrates freely through-
 5 out its surface, the scorings serving to weaken the wood across the grain but not with the grain.

While I have shown four scorings upon one side of the diaphragm and three alternating with them on the opposite side of
 10 the diaphragm, I do not wish to be limited to the number, width, or depth of such scorings or grooves.

I have further discovered that a diaphragm constructed in accordance with Figs. 3 and 4 may be made from any suitable wood, special close grained, hard wood
 15 being unnecessary.

While I have illustrated my improved diaphragms as applied to a phonograph sound box, I do not wish to be restricted to such specific use, as my diaphragms might
 20 be used in analogous arts, for instance in telephone receivers and other sound producing instruments.

What I claim as my invention is:—

1. In a phonograph sound box the combination with a casing, and a diaphragm therein supported between rubber gaskets,
 30 of a thin wooden diaphragm therein having an imperforate central portion and four equally spaced openings adjacent its periphery, said wooden diaphragm being mounted parallel to the first mentioned diaphragm and spaced therefrom by one of
 35 said gaskets.

2. A sound modifying plate adapted to be mounted within a sound box casing comprising a thin wooden member adjusted to fit
 40 such casing and having an imperforate central portion and four equally spaced openings adjacent its periphery.

3. In a sound box for a phonograph, the combination with a casing, rubber gaskets
 45 within the casing and a diaphragm supported within the casing between said gaskets, of a thin wooden diaphragm provided with four equally spaced openings adjacent its periphery and grooves in both plane surfaces, cut across the grain of the wood, the
 50 grooves on one surface alternating with the grooves on the other surface, said wooden diaphragm spaced from said first diaphragm by one of said gaskets.

4. In a sound box for a phonograph, the combination with a cylindrical casing provided with a constricted sound outlet axially positioned in one end thereof, and a diaphragm supported by the casing and
 60 forming a closure for the other end of said casing, of a thin wooden diaphragm supported within the casing parallel to said first diaphragm and between said first diaphragm and the outlet end of said casing, said wooden diaphragm provided with
 65

openings therein out of alinement with said outlet and grooves in both plane surfaces, cut across the grain of the wood.

5. In a sound box for a phonograph, the combination with a casing provided with a
 70 sound outlet and a first diaphragm supported within the casing, of a thin wooden diaphragm, supported within said casing between said first diaphragm and said outlet, said wooden diaphragm provided with
 75 openings therein, out of alinement with said outlet, and grooves cut in the plane surfaces thereof across the grain of the wood.

6. In a sound box for a phonograph, the combination with a casing of a diaphragm
 80 and an auxiliary wooden diaphragm supported therein and spaced apart, said wooden diaphragm, provided with four equally spaced openings, adjacent its periphery, and grooves cut in the plane surfaces
 85 thereof across the grain of the wood.

7. In a sound box for a phonograph, the combination with a casing, of a diaphragm and an auxiliary wooden diaphragm supported therein, said wooden diaphragm provided with a series of equally spaced openings, adjacent its periphery, and grooves cut in the plane surfaces thereof across the
 90 grain of the wood.

8. In a sound box for a phonograph, the combination with a casing of a diaphragm
 95 and an auxiliary wooden diaphragm supported therein, said wooden diaphragm provided with parallel grooves in both plane surfaces cut across the grain of the wood, the grooves on one surface alternating with
 100 the grooves on the other surface.

9. In a sound box for a phonograph, the combination with a casing, of a diaphragm and an auxiliary wooden diaphragm supported therein, said wooden diaphragm provided with grooves in both plane surfaces cut across the grain of the wood.

10. A diaphragm for a phonograph consisting of a thin circular wafer of wood
 110 provided with a series of equally spaced openings adjacent its periphery and parallel grooves cut across the grain in both plane surfaces thereof, the grooves in one surface alternating with the grooves in the
 115 other surface.

11. A diaphragm for a phonograph consisting of a thin circular wafer of wood provided with a series of equally spaced openings adjacent its periphery and grooves
 120 cut across the grain in both plane surfaces thereof, the grooves in one surface alternating with the grooves in the other surface.

12. A diaphragm for a phonograph consisting of a thin circular wafer of wood provided with a series of equally spaced openings adjacent its periphery and grooves cut across the grain in both plane surfaces thereof.

13. A diaphragm for a phonograph consisting of a thin circular wafer of wood provided with parallel grooves cut across the grain in both plane surfaces thereof,
5 the grooves in one surface alternating with the grooves in the other surface.

14. A diaphragm for a phonograph consisting of a thin wafer of wood provided with grooves cut across the grain in both
10 plane surfaces thereof, the grooves in one surface alternating with the grooves in the other surface.

15. A diaphragm for a phonograph consisting of a thin wafer of wood provided

with grooves cut across the grain in both 15 plane surfaces thereof.

16. A diaphragm for a phonograph consisting of a thin wafer of wood provided with rectilinear grooves cut across the grain
20 of the wood.

17. A diaphragm for a phonograph consisting of a thin wafer of wood provided with grooves cut across the grain of the wood.

In testimony whereof I affix my signature. 25

JOSEPH C. KULP.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

The first part of the paper is devoted to a general
 discussion of the problem. It is shown that the
 problem is of great importance in the theory of
 functions. The second part is devoted to a
 detailed study of the problem. It is shown that
 the problem is of great importance in the theory of
 functions. The third part is devoted to a
 detailed study of the problem. It is shown that
 the problem is of great importance in the theory of
 functions.

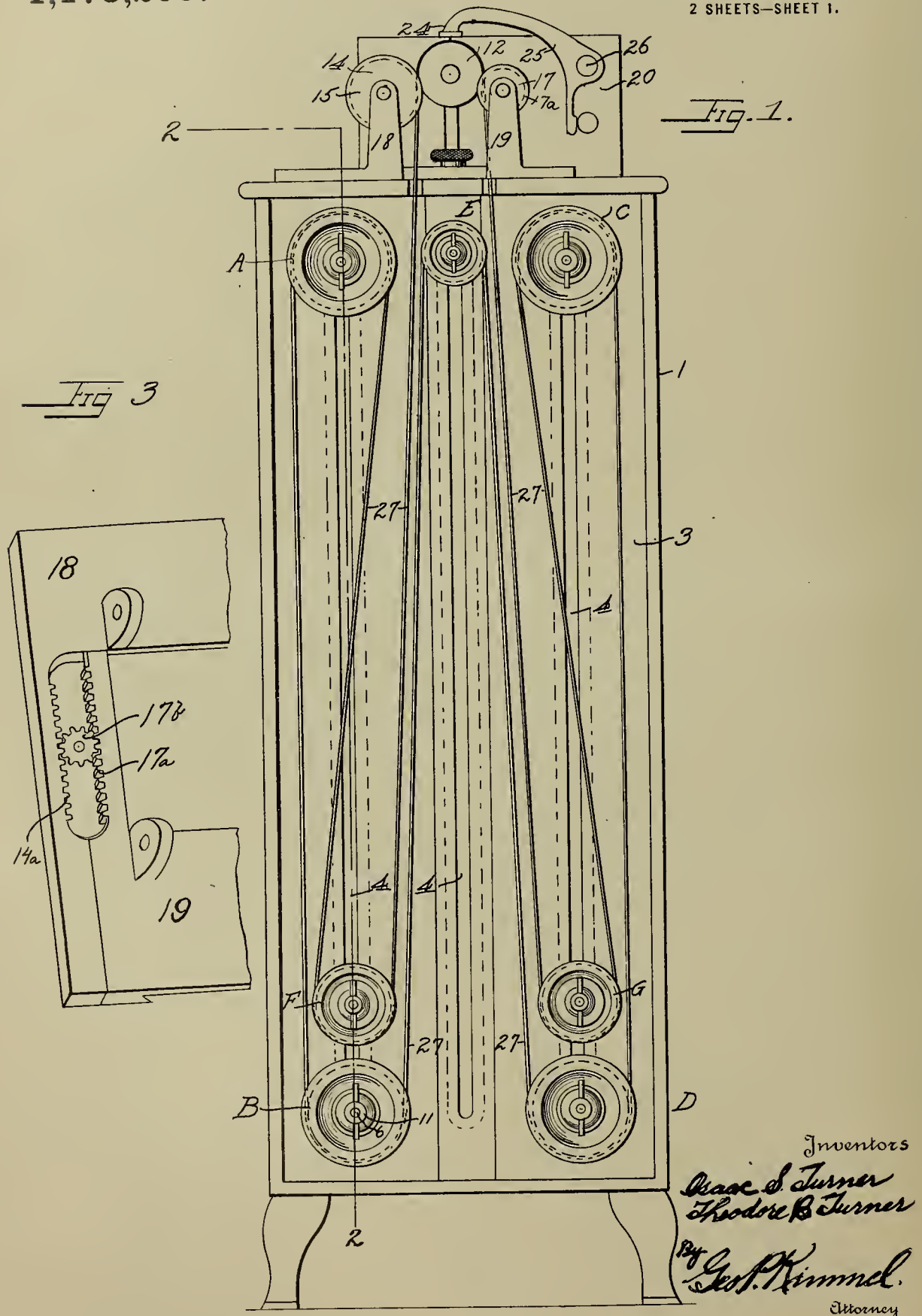
GRAPHOPHONE PATENT.

TAPE GRAPHOPHONE,
1,175,205-----I. S. & T. B. Turner,
Patented-March 14th, 1916.
Filed-July 12th, 1915.

I. S. & T. B. TURNER.
TAPE GRAPHOPHONE.
APPLICATION FILED JULY 12, 1915.

1,175,205.

Patented Mar. 14, 1916.
2 SHEETS—SHEET 1.

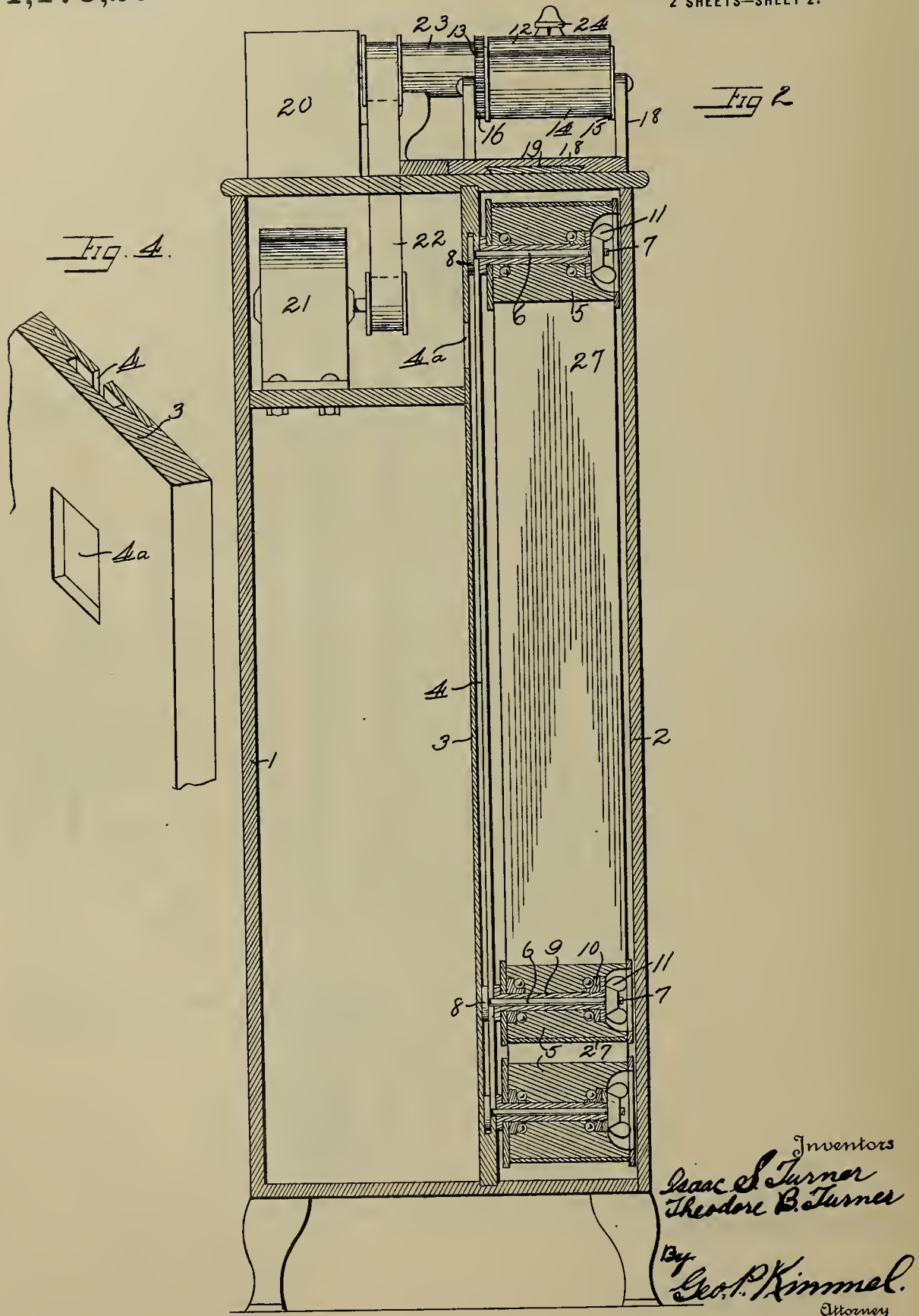




I. S. & T. B. TURNER.
TAPE GRAPHOPHONE.
APPLICATION FILED JULY 12, 1915.

Patented Mar. 14, 1916.
2 SHEETS—SHEET 2.

1,175,205.



Inventors
Isaac S. Turner
Theodore B. Turner
By
Geo. P. Kimmel.
Attorney

UNITED STATES PATENT OFFICE.

ISAAC S. TURNER, OF CENTRALIA, WASHINGTON, AND THEODORE B. TURNER, OF
PENTICTON, BRITISH COLUMBIA, CANADA.

TAPE-GRAPHOPHONE.

1,175,205.

Specification of Letters Patent.

Patented Mar. 14, 1916.

Application filed July 12, 1915. Serial No. 39,416.

To all whom it may concern:

Be it known that we, ISAAC S. TURNER and THEODORE B. TURNER, citizens of the United States, residing at Centralia, in the county of Lewis and State of Washington, and Penticton, Province of British Columbia, Canada, respectively, have invented certain new and useful Improvements in Tape-Graphophones, of which the following is a specification.

This invention relates to improvements in aoustics, and more specifically to tape graphophones.

The object of our invention is to provide a graphophone construction that will utilize an endless tape of considerable length upon which the etching for reproduction is contained, and of a width adapted to receive a continuous line of etching successively disposed with respect to the width of the tape. This system of arrangement provides for the placing upon a single record a very lengthy production, or an entire music or other program which may be reproduced without interruption for the frequent changing of records, as when small cylinder records are used. At the same time our device may be interchangeably used for cylinder records.

A further object of our invention is to provide a novel endless tape construction for use in recording and reproducing sound when used in connection with our novel graphophone.

Other objects of this invention not at this time more particularly enumerated, will be clearly understood from the detailed description and drawings forming a part of this specification.

Furthermore, this invention consists in the novel arrangement and combination of parts more particularly described in the following specification and embodied in the claim appended hereunto and forming a part of this application.

Referring now to the drawings, which are merely illustrative of our invention, Figure 1 is a side elevation of our device with the side cover removed to show the interior arrangement of the parts. Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1. Fig. 3 is a detail view of the sliding support construction. Fig. 4 is a fragmental detail of the partition showing the cut-out

portion adapted to admit the shaft of the 55 rollers to the slots.

Referring further to the drawings, wherein similar reference characters designate similar parts throughout the respective views, 1 designates a rectangular casing, 60 provided with a removable panel or door 2 upon the side thereof. A vertically disposed partition 3 is mounted within said casing, said partition being formed with a plurality of vertically disposed elongated slots 4 65 spaced apart in parallelism, said slots being T-shaped in cross section. A cut-out portion 4^a is provided near one end of each of the slots 4 so as to register with the rear walls thereof. 70

A plurality of idler rollers, A, B, C, D, E, F, and G, generally designated by 5, are each formed with a shaft 6, screw-threaded at 7 upon one end and having a head 8 upon the other end thereof. Said shaft is adapted 75 to be inserted within the slot 4 in such manner that the head 8 thereof will engage with the interior face of said slot. A spool-shaped sleeve 9 is mounted upon said shaft 6. A ball-bearing roller 10 is mounted upon said 80 sleeve intermediate the end flanges thereof. A winged nut 11 is adapted to fit upon the threaded end of the shaft 6 and to engage with one end of the sleeve 9, thereby causing the other end of said sleeve and the head 8 85 of said shaft to bindingly engage with the side of said partition adjacent the slotted portion thereof. The rollers may therefore be retained in horizontal position at any predetermined point within the grooves, 90 merely by the operation of the winged nut. The shafts of said rollers are mounted within the slots 4 through the cut-out portions 4^a in the partition.

The rollers A, B, C, and D, are preferably 95 larger in circumference than the rollers E, F, and G, and in the construction shown, wherein three parallel grooves are provided, we have shown the smaller roller E mounted within the central groove, while the small 100 roller F is mounted between the larger rollers A and B in one of the grooves, and the small roller G is mounted between the larger rollers C and D in the other of said grooves. 105

A record mandrel 12 is mounted centrally upon the top of the casing 1, rotatably mounted at its ends, and having a gear

wheel 13 fixed upon one end thereof. A guide roller 14, having flanged ends 15, is rotatably mounted adjacent one side of said mandrel and is disposed slightly below the axial center of said mandrel. Said roller 14 has a gear wheel 16 mounted upon one end thereof adapted to mesh with the gear wheel 13 on said mandrel. A friction roller 17, having flanged ends 17^a, and preferably smaller in circumference than said mandrel and said roller 14, is rotatably mounted adjacent the other side of said mandrel, and is disposed slightly below the axial center of said mandrel. The L-shaped supports 18 and 19 of said rollers 14 and 17 respectively, are slidably adjustable with respect to said cylinder. This is accomplished by forming a rack arm 14^a integral with the outside of support 18 and forming a cooperating rack arm 17^a integral with support 19 spaced apart inwardly with respect to rack arm 14^a. A hand operated pinion 17^b is interposed between said rack arms.

A gear box 20, containing a conventional type of gearing (not shown) is operated by means of a motor 21 and a belt drive 22 interposed therebetween, and is connected with the mandrel 12 by means of an arbor 23.

A sound box 24, is mounted on a pivoted arm 25, which is mounted upon a shaft 26, whereby said sound box is permitted to travel transversely of the tape record when the graphophone is in operation.

An endless tape 27 made of a material adapted to receive an etching from which sound may be reproduced, may be made of various lengths, according to the length of the record. The said tape is placed in operative position by removing the side panel or door, adjusting the rollers 14 and 17 in spaced apart relation with respect to the cylinder, inserting one portion of the tape

over the cylinder, and adjusting the balance of the tape over the various rollers A, B, C, D, E, F, and G, or any number of them as may be necessary to retain the entire tape in a taut condition, it being obvious that the said rollers are vertically adjustable within the grooves for the purpose of increasing or decreasing the relative distance between the rollers or any number of them.

The utility, adaptability, and advantages of our improved form of tape graphophone being obvious, it is unnecessary to further enlarge upon the same herein.

Having now described and pointed out the new and useful features of our invention, we do not limit ourselves to the shape of certain parts where the shape is not essential, nor do we restrict ourselves to the exact details of construction shown and described, but mean and intend to claim all equivalents and variations thereof not departing in principle from our invention and falling within the purview of the appended claim.

What we claim as our invention and desire to secure by Letters Patent is:

In a graphophone, in combination, a rectangular casing, a partition vertically mounted within said casing, said partition formed with a plurality of vertically disposed slots therein, a plurality of rollers adjustably mounted within said slots, a cylinder mounted upon said casing, a sound box mechanism mounted upon said casing, a rotating mechanism mounted upon said casing adapted to rotate said cylinder, and an endless tape record adapted to engage with said cylinder and said rollers.

In testimony whereof we affix our signatures hereto.

ISAAC S. TURNER.
THEODORE B. TURNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

REPEATER,

1,175,639-----E. S. Keogh,

Patented-March 14th, 1916.

Filed-October 24th, 1914.

(Assigned to A. G. Co., March
28, 1916).

E. S. KEOGH.
REPEATER.

APPLICATION FILED OCT. 24, 1914.

1,175,639.

Patented Mar. 14, 1916.

2 SHEETS—SHEET 1.

Fig. 1

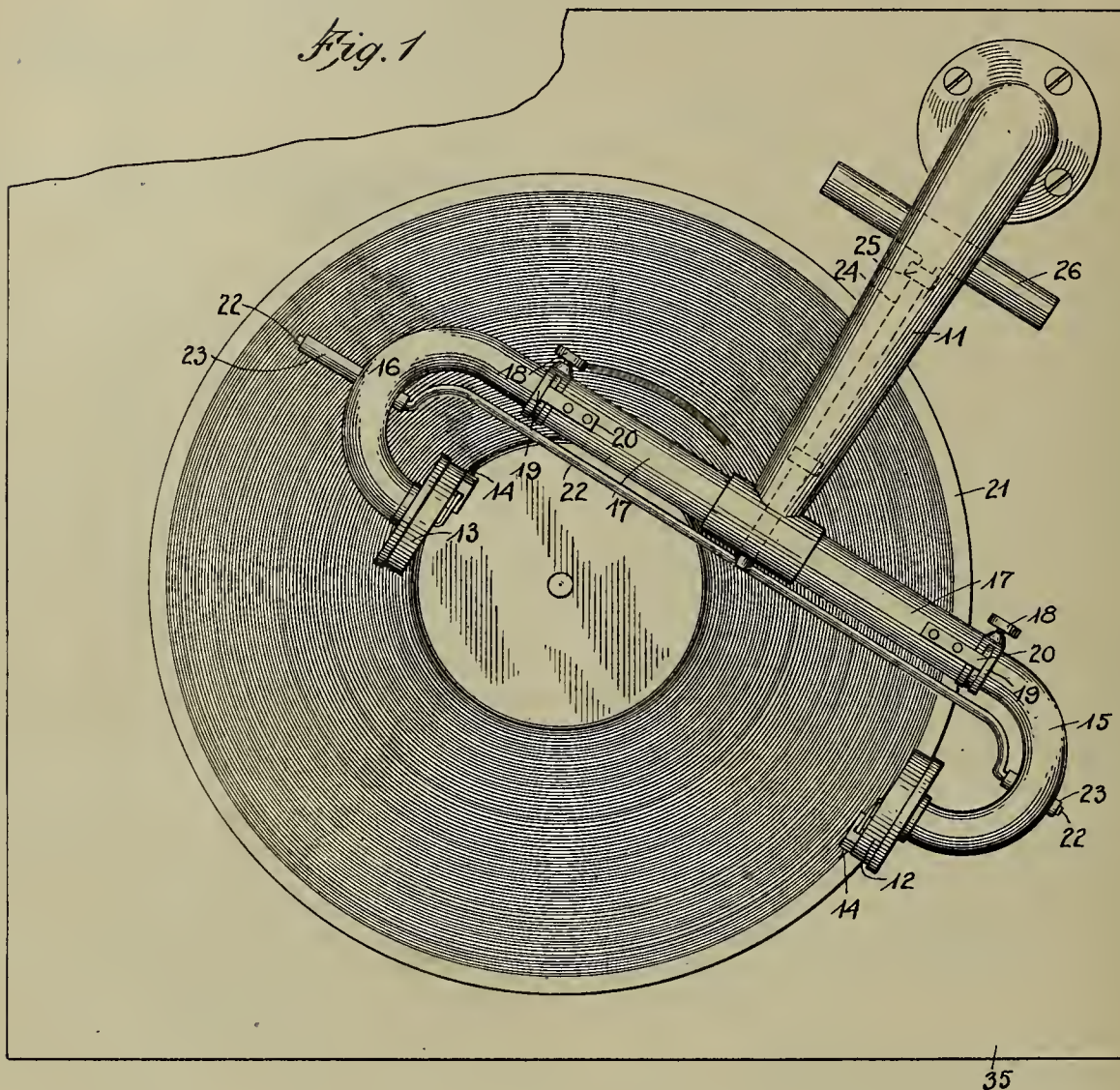
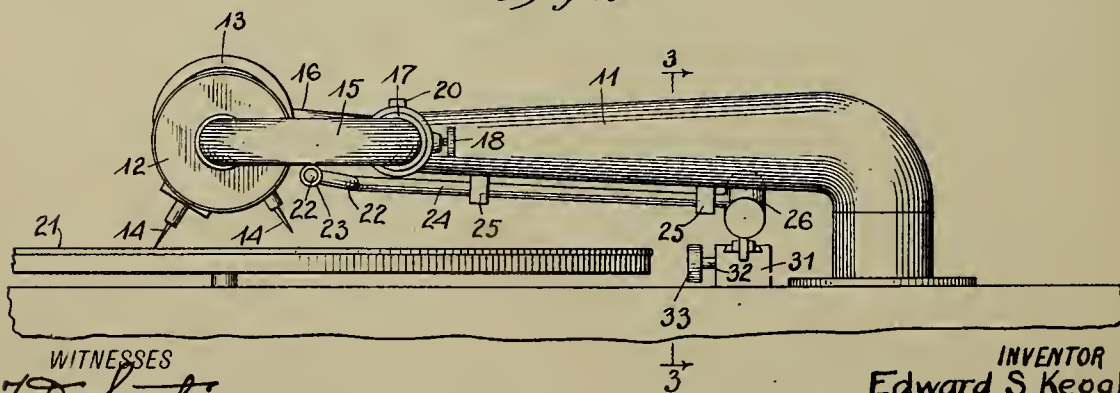


Fig. 2



WITNESSES

F. D. Sweet

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ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWARD S. KEOGH, OF NEW YORK, N. Y.

REPEATER.

Assigned to American Graphophone Co. March 28, 1916.

1,175,639.

Specification of Letters Patent.

Patented Mar. 14, 1916.

Application filed October 24, 1914. Serial No. 868,419.

To all whom it may concern:

Be it known that I, EDWARD S. KEOGH, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Repeater, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to provide means for automatically replaying a disk record; to diminish the time interval between the repetitions of the playing of said disk record; and to noiselessly suspend and inaugurate the playing of said record.

Drawings.—Figure 1 is a plan view of a talking machine employing a record disk, showing in conjunction therewith a repeater constructed and arranged in accordance with the present invention; Fig. 2 is a side edge view of the same; Fig. 3 is a cross section on an enlarged scale, taken as on the line 3—3 in Fig. 2; Fig. 4 is a top plan view showing a fragment of a record disk, and in conjunction therewith a modified form of the invention; Fig. 5 is a front edge view of the construction shown in Fig. 4; Fig. 6 is a detail view on an enlarged scale, showing in cross section a central fragment of a disk constructed and arranged in accordance with the modified form of the invention.

Description.—As seen in the drawings, the present invention involves the employment, in conjunction with a single-tone tube 11, of two sound boxes 12 and 13, each of which is conventionally equipped with a reproducing needle 14. The sound boxes 12 and 13 are provided with goosenecks 15 and 16, arranged each telescopically and rotatively in a tube 17. The tube 17 is fixedly mounted in the sleeve of the tone tube 11 and in open communication therewith. Each of the goosenecks 15 and 16 is independently adjustable in the tube 17. In this manner it is possible to adjust the sound boxes 12 and 13 to accommodate the width of the record zone on the record disk. When the sound boxes and needles 14 thereof are adjusted in their relation to said record zone, the goosenecks and tube 17 are secured in relatively fixed relation by set screws 18 and split collars 19. To steady the action of the goosenecks 15 and 16 and the boxes 12 and 13 carried thereby, drag springs 20 are employed, each spring being rigidly secured at one end of the tube 17. The free

end of each spring rests in the split grooves formed in the collars 19, as seen best in Fig. 1 of the drawings. Normally, the goosenecks 15 and 16 are supported above and out of engagement with the record disk 21, a balancing bar 22 being employed for this purpose. The ends of the bar 22 are bowed and shaped to pass under the goosenecks 15 and 16, where they are furnished with rubber or other soft sleeves 23. The balancing bar 22 is rigidly connected at the end of a pivot shaft 24, which is extended lengthwise of and below the center of the tone tube 11, being supported thereon by bearings 25. At the end removed from the bar 22 the shaft 24 is rigidly connected to a balancing tube 26. The tube 26, as shown best in Fig. 3 of the drawings, is preferably charged with a limited quantity of mercury 27. From the under side of said tube are extended lugs 28. The lugs 28 have inclined faces to slide over the correspondingly inclined faces of heads 29 formed at the ends of short rack bars 30. The rack bars 30 are slidably mounted in a block 31, wherein are mounted small shafts 32, at the exposed ends of which are manipulating wheels 33. Rigidly mounted on said shafts 32 are sprocket wheels 34, the teeth of each of which engage the teeth of one of the rack bars 30. The particular object in constructing and arranging the rack bars 30 and feeding mechanism therefor as described, is to adjust the heads 29 to operatively engage the lugs 28 at the extremes of the movement of the tone tube 11 when the needles of the sound boxes 12 and 13 are set to correspond with the outer and inner edge of the record zone above mentioned. The block 31 is rigidly mounted on the bed plate or table of the talking machine case, and is relatively immovable.

Operation.—Having a repeater constructed and arranged in accordance with the present invention and as above described, the operation is as follows:—To adjust the sound boxes and the needles 14 to the record zone of each record disk, the set screws 18 are manipulated to release the goosenecks 15 and 16. Said goosenecks are then moved in the tube 17 until at one side of the record disk the needle 14 of the sound box 12 is placed in the outermost groove of the record zone, and the needle 14 of the sound box 13 registers with the innermost groove of the record zone. It will be understood that the goose-

necks 15 and 16 are freely slidable over the sleeves 23. When the sound boxes are thus adjusted, the screws 18 are tightened to hold in adjusted position the collars 19. While
 5 the tube 26 is held in level position, the goosenecks 15 and 16 resting on the soft sleeves 23, the needles 14 of both boxes are disengaged from the record disk 21. Said record disk is started while the boxes are
 10 held in this position by the balancing bar 22. When the record disk has acquired sufficient momentum, the box 12 is lowered until the needle 14 mounted thereon engages the outermost convolution of the sound record
 15 groove. In thus lowering the gooseneck 15, the mercury 27 flows to the end of the balancing tube 26 which corresponds with the gooseneck 15. The weight of the mercury thereafter tilts the bar 22 to cause
 20 the needle 14 on the box 12 to engage the record groove. Subsequent to the adjustment of the boxes 12 and 13 as described, the rack bars 30 are arranged to adjust the heads 29 thereof to tilt the tube 26 and the
 25 balancing bar 22 when either of the sound boxes has reached the end of the sound record. To accomplish this, the sound box 12 is preliminarily lifted and moved to the innermost groove of the sound-reproducing
 30 record zone. The wheel 33 on the side of the block 31 corresponding with the box 12 and gooseneck 15 is then manipulated to adjust the rack bar 30 with which it is connected and the head 29 thereof until said
 35 rack bar and head press upon the lowered lug 28 to rock the tube 26, to the end that the mercury 27 will flow to the opposite end of said tube. As previously explained, the mercury 27 has sufficient weight to overcome the balance of the goosenecks 15 and
 40 16. Being thus overbalanced, the tube 26 gradually rocks on the shaft 24 to seat the needle 14 in the box 13 at the outer edge of the record zone, while lifting the needle 14 of the box 12 out of the groove at the inner
 45 edge of said zone. The box 13 is now moved by the spiral record groove, to the inner edge of the zone, and the second wheel 33 and its companion rack bar 30 are manipulated to rock the tube 26 and balancing
 50 bar 22 in the relatively reverse direction. When thus adjusted, the rack bars 30 are permitted to remain, with the effect that as the boxes 12 or 13 move to register with the groove at the inner edge of the record zone,
 55 the respective heads 29 will engage their companion lugs 28 and rock the tube 26 and bar 22. When the above adjustments have been made, it will be understood that the operator may hold the tube 26 and bar 22 in
 60 level position, when the needles of both of the boxes are above the surface of the disk 21. When said disk has acquired sufficient momentum, the tube 26 and bar 22 are
 65 rocked to lower the box 12, the needle 14

thereof engaging the groove at the outer edge of the record zone. The mercury 27, having flowed to the depressed end of the tube 26, retains said tube and the bar 22 in
 position where the box 12 is lowered and the
 70 box 13 is raised. This condition of the mechanism is maintained until, as the box 12 moves into register with the last convolution of the record groove at the inner end of the record zone, the lug 28 on the
 75 tube 26 engages the head 29 previously disposed in its path, to the end that the tube 26 is lifted to permit the mercury 27 to flow to the opposite end of the tube 26. The mercury 27 thus passing to the opposite end of
 80 the tube 26, depresses the same and rocks the shaft 24 and balancing bar 22 to lower the sound box 13 while elevating the box 12. The needle 14 on the box 13 now engages the outermost convolution of the record
 85 groove, and is moved by said groove toward the center of the disk 21, until in its turn the lug 28 on the corresponding end of the tube 26 is engaged by the head 29, and the tube 26 is again rocked on the shaft 24, to
 90 lower the box 12 and elevate the box 13. This action, if not interrupted manually, would continue indefinitely.

In Figs. 4, 5 and 6, a modified form of the invention is disclosed. The modifica-
 95 tion consists in substituting for the goosenecks 15 and 16, telescopic tubes 36 and 37. The sound boxes 12 and 13 are mounted upon the ends of the tubes 36 and 37. When employing this modified form of the inven-
 100 tion, the record disks 21 are preferably formed with a raised center 39, the edge of which is shaped to provide an incline 40. The incline 40 extends from the upper level of the raised center 39 to the lower level of
 105 the record zone. The inner end 41 of the record groove in said zone is impressed at the lower end of said incline to guide the needles 14 upward for delivery upon said incline. The end 41 is not continued on the
 110 incline 40, it being designed to free the needle on said incline, so that it may be moved laterally over the same, when the opposite needle is engaged by the outer convolution of the record zone, to be moved
 115 thereby toward the center of the record disk, which movement on the part of the engaged needle produces a corresponding movement on the part of the other needle.

When provided with a repeater constructed and arranged in accordance with the modified form of the invention, the operation is as follows: The needles of the boxes 12 and 13 are moved to register with the
 120 outer and the inner convolutions of the record zone. To this end the tubes 36 and 37 are adjusted in a tube 42 carried by the cross head 38. The drag springs 20 operate to hold the tubes 36 and 37 in adjusted
 125 relation to the tube 42. After this registry
 130

has been effected, the sound box 13 is slightly rotated so that the needle 14 thereof will rest lightly on the surface of the raised center 39 when the needle 14 of the sound box 12 rests in the record groove of the record zone. The adjustment between the tubes 36 and 37 and the sound boxes 12 and 13 being now fixed, remains constant in relation to the tube 42. The tube 42 is free to rotate in the cross head 38. The sound boxes 12 and 13 are slightly rotated to free the needles 14 thereof from engagement with the record groove, and the revolution of the disk 21 is inaugurated. When the disk 21 has attained sufficient momentum, the sound box 12 is turned to place the needle 14 thereof in the record groove. Consequent upon turning the sound box 12, the sound box 13 and connecting tubes 36, 37 and 42 are likewise rotated, to the end that the needle 14 in the sound box 13 is further lifted from the disk 21. This condition continues until the needle in the sound box passes by way of the end 41 of the record groove, upon the incline 40. The lift of the incline 40 rotates the box 12, connecting tubes 36, 37 and 42 and the box 13 until the needle 14 mounted on the latter box engages the outermost convolution of the record groove. This engagement is effected when the needle in the box 14 is on the level portion of the incline 40. The spiral arrangement of the record groove immediately moves the box 13 and parts connected therewith toward the center of the disk 21 from the side thereof opposite to that which is initially engaged by the needle on the box 12. The immediate result of this action is to remove the needle mounted on the box 12 from the incline 40. From the above stage of the operation the tone tube 11 swings in a direction opposite to that followed by said tube when controlled by the engagement of the needle in the box 12. When the needle in the box 13 in turn reaches the end 41 of the record groove and passes up the incline 40, the box 13, tubes 37, 36 and 42 and the box 12 are rotated, to the end that the needle in the box 12 which now registers with the convolution at the outer edge of the record zone, is engaged by the record groove. If uninterrupted, the alternate engagements of the needles in the two boxes, with the record groove, will continue.

While I have herein described the employment of a particular structure for rocking the balancing bar 22 and for rotating the tubes 36, 37 and 42, to alternately engage the needles in the oppositely-disposed sound boxes, I do not wish to be understood as limiting myself to the particular form of structure shown and described. It is obvious that other means for overbalancing the bar 22 may be employed without requiring invention or varying the scope and prin-

ciple of operation herein disclosed. Also, it is evident that an additional fixture may be substituted to operate in a manner similar to that described with reference to the raised center 39 and incline 40.

Claims:

1. The combination of a tone tube; a plurality of sound boxes arranged for operative engagement with a record disk; a tubular operative connection for said boxes and said tone tube, said connection extending transversely to and at opposite sides of the axis of said tone tube; and means for alternately engaging said sound boxes with said record disk at opposite sides of the center of said disk.

2. The combination of a tone tube; a plurality of sound boxes arranged for operative engagement with a record disk; a tubular operative connection for said boxes and said tone tube, said connection extending transversely to and at opposite sides of the axis of said tone tube; means permitting adjustment of said sound boxes to register with the outer and inner convolutions of the record zone of said record disk; and means for alternately engaging said boxes and said disk, the operation being timed for action coincident with the completion of travel of each box across said record zone.

3. The combination of a tone tube having an open-ended, tubular cross head; an open-ended extension tube mounted in said cross head; a plurality of sound boxes; a plurality of goosenecks, one connected with each sound box, mounted for telescopic adjustment in said extension tube; an operating mechanism mounted upon said tone tube for lifting said sound boxes alternately from engagement with a record disk; and means for initiating the operation of said mechanism.

4. The combination of a tone tube having an open-ended, tubular cross head; an open-ended extension tube mounted in said cross head; a plurality of sound boxes; a plurality of goose-necks, one connected with each sound box, mounted for telescopic adjustment in said extension tube; an operating mechanism stationarily disposed; and a balancing bar pivotally mounted on said tone tube and disposed for operative engagement with said mechanism stationarily disposed for alternately lifting said sound boxes.

5. The combination of a tone tube having an open-ended, tubular cross head; an open-ended extension tube mounted in said cross head; a plurality of sound boxes; a plurality of goosenecks, one connected with each sound box, mounted for telescopic adjustment in said extension tube; an operating mechanism stationarily disposed; a balancing bar pivotally mounted on said tone tube and disposed for operative engagement with said operating mechanism for rocking

said goose necks for alternately lifting said sound boxes; and means for manually adjusting said mechanism to vary the initiation of the operation of said balancing bar.

5 6. The combination of a tone tube; a record disk; a plurality of sound boxes operatively disposed at opposite sides of the center of said disk, said boxes being spaced a distance equaling the combined width of
10 the record zone and the center space within said zone; and means for alternately engaging said sound boxes at opposite sides of the center of said disk with the groove of said record zone.

15 7. The combination of a tone tube; a record disk; a plurality of sound boxes operatively disposed at opposite sides of the center of said disk, said boxes being spaced a distance equaling the combined width of
20 the record zone and the center space within said zone; means for alternately engaging said sound boxes at opposite sides of the center of said disk with the outer convolu-

tion of said record zone; and means permitting the separation of said sound boxes to
25 correspond with the variation in size of the record zone of different disks.

8. In combination; a tone tube; a plurality of sound boxes operatively mounted thereon in spaced relation therefrom at op-
30 posite sides thereof, said boxes being spaced apart and adapted for engagement with the outer convolution of a record disk at opposite sides of the center of said disk; and
35 means for simultaneously disengaging and engaging said sound boxes respectively and the grooves of a record disk, at opposite sides of the center thereof and on the same surface of said disk.

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

EDWARD S. KEOGH.

Witnesses:

E. F. MURDOCK,

PHILIP D. ROLLHAUS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

GRAMOPHONE RECORD,
1,175,728-----A. Eichengrun,
Patented-March 14th, 1916.
Filed-July 20th, 1912.

A. EICHENGRÜN.
GRAMOPHONE RECORD.
APPLICATION FILED JULY 20, 1912.

1,175,728.

Patented Mar. 14, 1916.

FIG. 1.

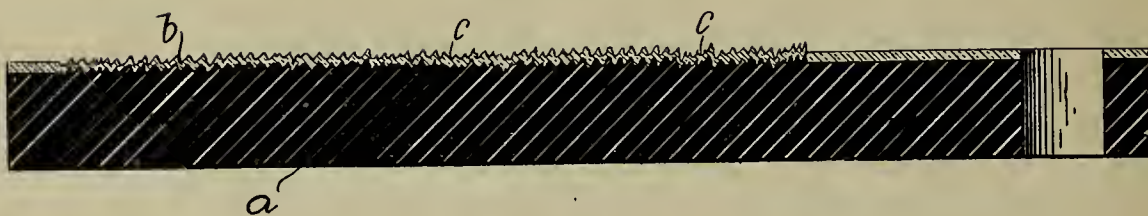


FIG. 2.

Witnesses:
C E Parsons
H. S. Alden

Inventor:
Arthur Eichengrün
By: - Allen Middleton Donaldson & Allen
Attys.

UNITED STATES PATENT OFFICE.

ARTHUR EICHENGRÜN, OF BERLIN, GERMANY.

GRAMOPHONE-RECORD.

1,175,728.

Specification of Letters Patent.

Patented Mar. 14, 1916.

Application filed July 20, 1912. Serial No. 710,679.

To all whom it may concern:

Be it known that I, ARTHUR EICHENGRÜN, a subject of the German Emperor, residing at 87 Konstanzerstrasse, Berlin, Germany, have invented certain new and useful Improvements in and Relating to Gramophone-Records, of which the following is a specification.

This invention relates to sound records, tablets, disks or other bodies for use in sound recording and sound reproducing machines.

Sound records used for gramophones and the like apparatus give after a very short use indistinct and impure tone. This is caused by microscopically small injuries to the edges of the sound grooves or phonetic characters. This phenomenon is due to the brittleness of the foundation material containing shellac, colophonium, asphalt and the like that is generally used for making such sound records. Numerous attempts have been made to obviate this drawback by replacing the usual foundation material by elastic substances such as celluloid, xylonite, gallalite, hardened gelatin, ebonite and the like. These materials, however, have not proved altogether satisfactory for this purpose. Celluloid, which was particularly recommended, is liable gradually to settle down until its surface become level, the phonetic characters then becoming partially or entirely obliterated; moreover celluloid is liable to shrink and its tension then becomes so altered as to warp the record. Apart from this physical change of celluloid the material itself is too hard for the purpose in question and produces a shrill harsh tone, and it is inconvenient to employ.

The present invention aims at obviating these drawbacks and at imparting to the record body the requisite degree of toughness coupled with a sufficient but not undue degree of hardness, and also at very materially improving the tone and the details of the phonetic record and at simplifying the process of its manufacture. For this purpose according to the present invention the foundation layer or body of the record is coated with a layer of cellulose ester containing the acetyl group prior to receiving the sound record and said sound record is then impressed in the layer of the cellulose ester and preferably also in the layer of other material immediately below said cel-

lulose ester. Record bodies produced in this way retain the phonetic characters permanently because the layer of cellulose ester containing the acetyl group is not liable to level down like a celluloid layer. Such records are not liable to shrink and in consequence of the plasticity and non-elastic character of the layer a fine, soft, mellow tone is obtained.

Owing to the high concentration of the solutions which can be prepared with cellulose ester containing the acetyl group, they can be applied to the record disk in one operation without the necessity of successive coatings or applications. The plasticity of the cellulose ester containing the acetyl group can be modified or adapted to the material in conjunction with which it is to be used, that is to say to the material forming the underlayer or body. This is of vital importance to the production of a good tone because it will be obvious that the particular kind of sound obtained from a record body of one kind of material (say for example cardboard) will be very different from the one obtained from a record body of a widely different material such for instance as vulcanite.

A further advantage is that, where the film of the cellulose ester is so thin that the sound record is impressed not only in said film but in the under-layer the guiding of the needle is effected by said under-layer as well as by the cellulose ester layer while the cellulose ester will protect the walls of the sound record in the under-layer and prevent them from crumbling or being otherwise damaged or defaced.

I have sometimes found it convenient not to make layers of cellulose ester containing the acetyl group alone but to employ mixtures of the same with softening agents such as di-chlorhydrin or with liquid or solid bodies adapted to impart increased plastic properties to the layers of cellulose ester such for example as camphor substitutes, and it will be obvious that if desired organic and inorganic filling materials, especially in a finely powdered state may be admixed therewith. Of inorganic filling materials I have found mineral powders presenting a certain resistance to the needle especially convenient, such for example as gypsum, kieselguhr, or the like.

The invention is diagrammatically illus-

trated in the accompanying drawings, in which:—

Figure 1 represents in section one form of the disk; and Fig. 2 another form thereof.

In the said drawings, *a* represents the foundation plate of resinous or other foundation material, and *b* the covering or layer of cellulose ester containing the acetyl group.

c represents the phonetic characters which it will be observed are impressed into both the cellulose ester coating and into the foundation plate.

The covering film is produced upon the shellac or other foundation plate either by coating the latter with a solution of cellulose ester containing the acetyl group with or without other substances, or by dipping the plates in said liquid or by injecting the liquid thereupon in which case the operation can be effected repeatedly, either by several treatments with the same solution or by alternate treatments with solutions of different composition or viscosity, and capable of producing different degrees of hardness. Suitable solvents for this purpose are such solvents of cellulose ester containing the acetyl group as will not, in this mode of employment, exert a dissolving action on the shellac or other foundation plate such as for example mixtures of alcohol and benzene (C_6H_6). Or if desired the layers of cellulose ester can be made beforehand by allowing the solution to dry in thin sheets or films upon any suitable supporting surfaces, or by cutting such thin sheets or films from thicker plates or peeling them from blocks, and then combining them with the shellac foundation in a suitable manner such as by joining them together with a solvent or by warming, in some cases under pressure.

If desired the layer of cellulose ester may be provided with a backing *d* (Fig. 2) formed of thin paper, silk, tin foil or the like which can be effected in machines adapted to produce large rolls of such a layer with its backing. Said layer with its backing is then merely laid upon the hot shellac mass, or other foundation and a perfect impression can be made since the characters can readily be impressed into the shellac or other foundation. An easy way of affixing said layer with its backing may be by means of a suitable adhesive material such as glue.

The disks thus obtained from the shellac or like plate of foundation material with two layers or coatings of cellulose ester con-

taining the acetyl group can be easily impressed while hot in the known manner and the surface will take the phonetic writing with ease and at the same time with greater sharpness than a mere shellac or the like disk without the coating.

It should be remarked that while it is old to make records for sound recording and sound reproducing instruments from celluloid or to provide them with a coating of celluloid or nitro-cellulose ester or to coat phonographic records with an extremely thin film of cellulose ester subsequent to the impression of the phonetic writing by applying a very thin solution which on evaporation leaves a film that adapts itself to the contours of the preëxisting impression, the novel feature of the present invention is that the blank record plate is provided with a layer or film of cellulose ester containing the acetyl group before the phonetic writing is impressed on the plate, which layer is plastic and non-elastic and quite distinct from the elastic non-plastic layer of celluloid; and moreover retains the phonetic characters imparted thereto more permanently than is the case with celluloid or the like.

It will be obvious that if desired in place of shellac or colophonium or the like resins or other plastic masses as foundation material there may be employed fibrous or other suitable materials such as cardboard or the like; also that in place of cellulose ester containing the acetyl group for the coating mixtures of other cellulose esters may be employed.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A record blank comprising a backing or foundation and a facing layer of a composition of cellulose ester containing the acetyl group and a suitable softening agent.

2. A record blank comprising a backing or foundation and a facing layer comprising cellulose ester containing the acetyl group, a suitable plasticity ingredient, and a filling material.

3. A record blank comprising a foundation, a facing layer of a composition of cellulose ester containing the acetyl group and a suitable softening agent, and a spacing or backing layer for said facing layer.

In testimony whereof, I affix my signature in presence of two witnesses.

ARTHUR EICHENGRÜN.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.

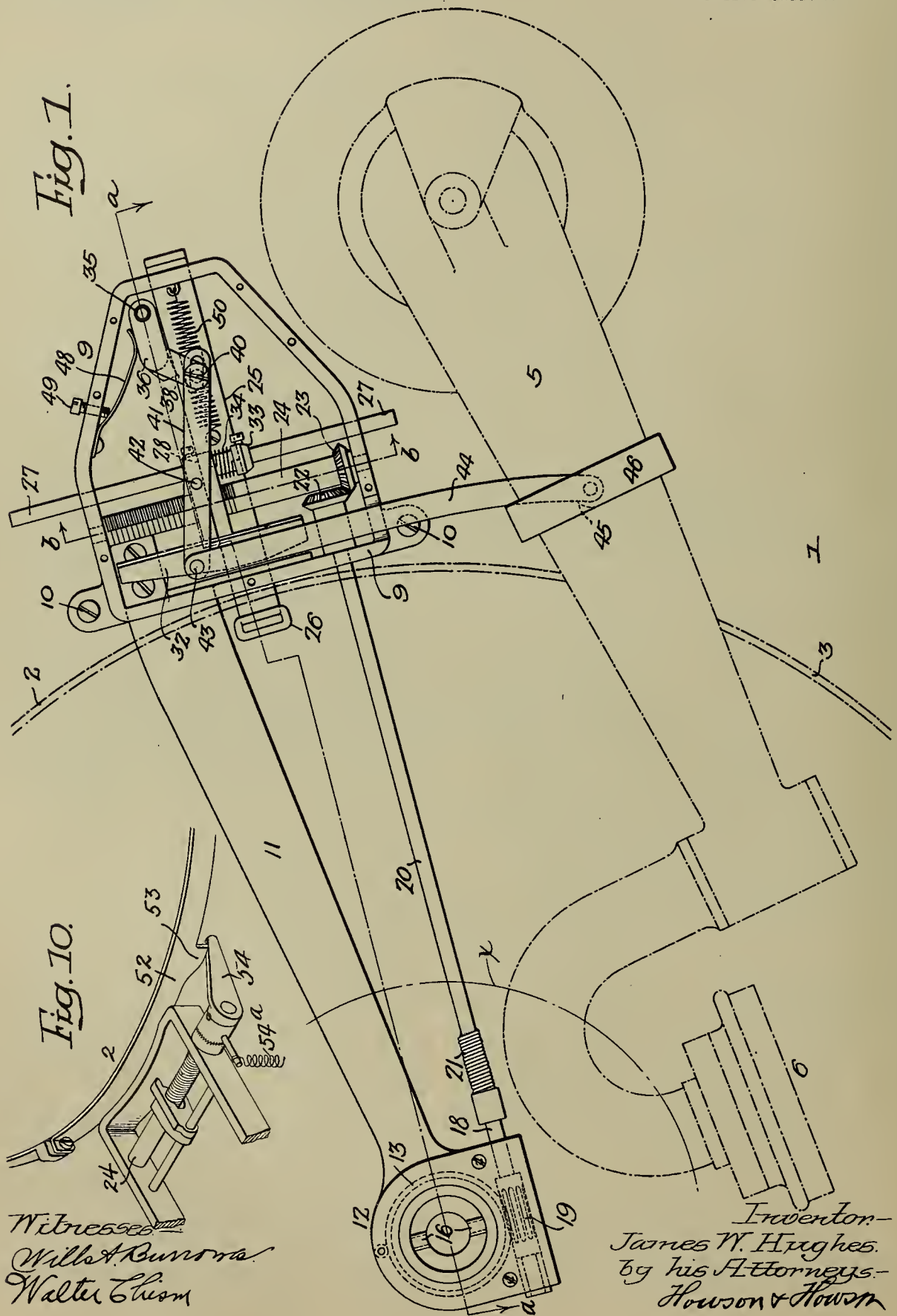
BRAKE MECHANISM FOR TALKING MACHINES,
#1,175,765-----J. W. Hughes,
Patented-March 14th, 1916.
Filed-July 17th, 1914.

J. W. HUGHES.
BRAKE MECHANISM FOR TALKING MACHINES.
APPLICATION FILED JULY 17, 1914.

1,175,765.

Patented Mar. 14, 1916.

2 SHEETS—SHEET 1.



Witnesses
Wills A. Burrows
Walter Chism

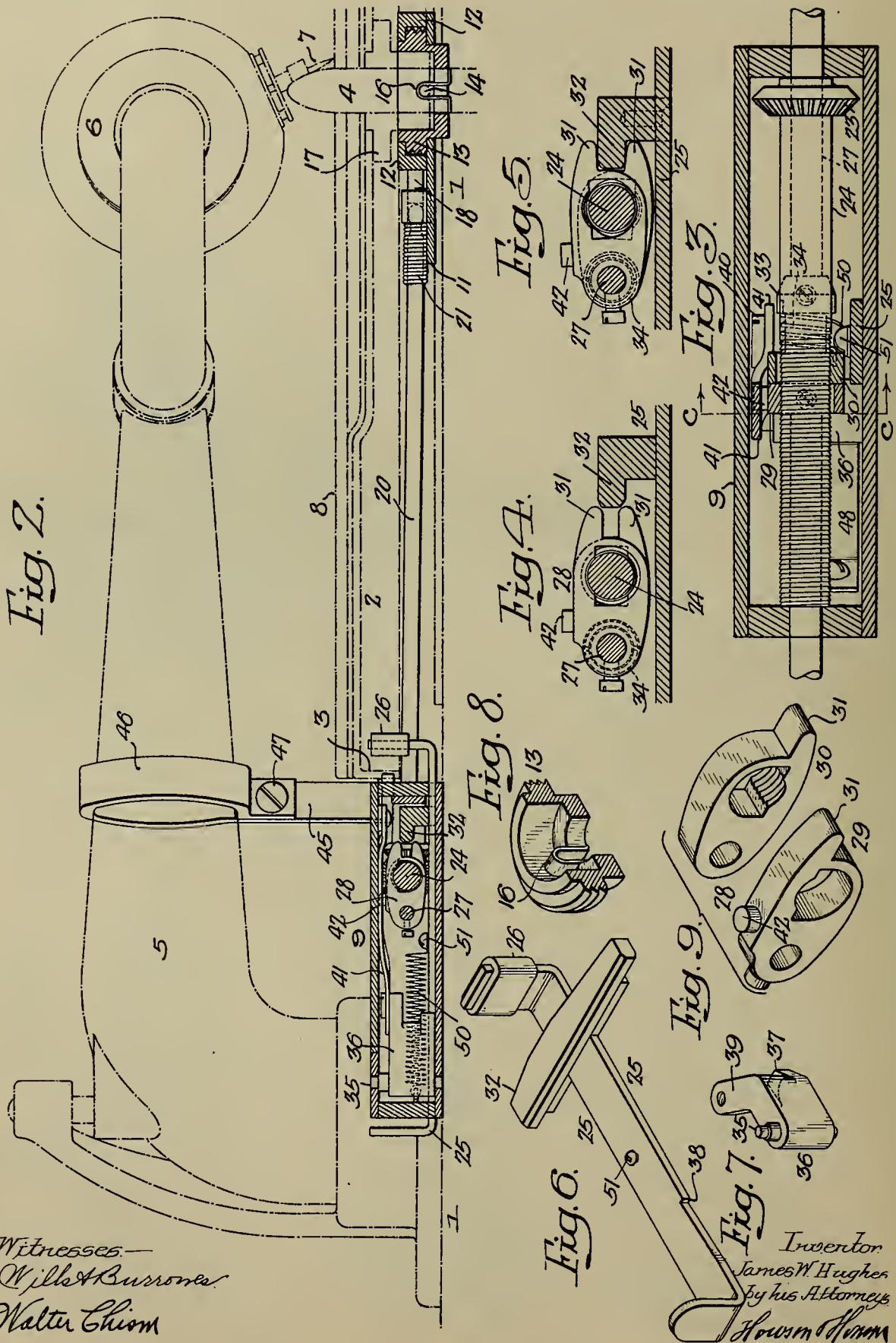
Inventor—
James W. Hughes.
by his Attorneys—
Howson & Howson

J. W. HUGHES.
BRAKE MECHANISM FOR TALKING MACHINES.
APPLICATION FILED JULY 17, 1914.

1,175,765.

Patented Mar. 14, 1916.

2 SHEETS—SHEET 2.



Witnesses—
Wills & Burrone
Walter Chism

Inventor
James W. Hughes
by his Attorneys
Howson & Howson

UNITED STATES PATENT OFFICE.

JAMES W. HUGHES, OF NARBERTH, PENNSYLVANIA, ASSIGNOR TO HUGHES-LIPPINCOTT COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

BRAKE MECHANISM FOR TALKING-MACHINES.

1,175,765.

Specification of Letters Patent.

Patented Mar. 14, 1916.

Application filed July 17, 1914. Serial No. 851,525.

To all whom it may concern:

Be it known that I, JAMES W. HUGHES, a citizen of the United States, residing in Narberth, county of Montgomery, State of Pennsylvania, have invented certain Improvements in Brake Mechanism for Talking-Machines, of which the following is a specification.

One object of my invention is to provide a brake which will stop the rotation of the record carrier of a talking machine immediately after the record has been completed, irrespective of the length of the record.

A further object of the invention is to construct the mechanism so that the brake will be held clear of the carrier while the arm carrying the needle travels toward the center of the record, but as soon as the record is completed and the lateral movement of the arm is stopped then the brake will be applied, due to the continued movement of a part of the mechanism which causes the brake to be released.

In the accompanying drawings:—Figure 1, is a plan view illustrating my improved brake mechanism with the cap plates removed and sufficient of a talking machine disk carrier and arm shown by dotted lines; Fig. 2, is a longitudinal sectional view on the line *a—b*, Fig. 1; Fig. 3, is an enlarged transverse sectional view on the line *b—b*, Fig. 1; Fig. 4, is a sectional view on the line *c—c*, Fig. 3, with the clutch in engagement with the screw; Fig. 5, is a similar view, showing the clutch out of engagement; Fig. 6, is a detached perspective view of the brake rod; Fig. 7, is a detached perspective view of the pawl which engages the brake rod; Fig. 8, is a sectional perspective view of one of the right angle gears; Fig. 9, is a detached perspective view of the clutch; and Fig. 10, is a view illustrating means for actuating the mechanism from the periphery of the disk carrier.

In the accompanying drawings, 1 is the base of the talking machine using disk records.

2 is the rotating disk carrier having a downwardly extending flange 3. This carrier is mounted on the upper end of the rotating shaft 4 which extends through the table 1.

5 is the tapered tone arm carrying at its outer end the reproducer 6.

7 is the needle which rests upon the record 8.

All of the above mechanism is shown by dotted lines in the drawings, which is one of the standard makes of talking machines.

In each disk record of the talking machine is a concentric groove, which is located at the inner end of the spiral record groove, so that, immediately after the termination of the record piece, the needle is shifted into this concentric groove and the tone arm ceases to travel toward the center of rotation of the disk record. The usual practice is to manually stop the rotation of the mechanism, or to provide a brake which is actuated by the tone arm coming in contact with the tripping mechanism, but as the records are of different lengths the brakes heretofore employed had to be set after each record used, as the records all terminate at different points and the position of the concentric groove varies with each record.

By my invention I utilize the automatic stopping movement of the tone arm to release the brake mechanism, so that this mechanism will be applied irrespective of the position of the tone arm, providing the needle is located in the concentric groove.

9 is a casing inclosing the improved brake mechanism. This casing can be secured to the base 1 by one or more screws 10, as desired, and projecting from this casing is an arm 11, which carries a bearing through which extends the shaft 4 on which the record carrier is mounted. Located within the bearing 12 is a spiral gear wheel 13, which is engaged by the pins 14 on the shaft 4. The gear has sockets 16 formed by bending two thin plates and securing them to the wheel so that the sockets will enter the notches in the hub 17 of the record carrier 2 without the necessity of altering any of the parts, as the pin 14, in standard machines, directly engages the hub 17. In the bearing 12 is a short shaft 18 which has a gear wheel 19 thereon meshing with the wheel 13, and this shaft is flexibly connected to a shaft 20 by a coiled spring 21. The shaft 20 has its bearings in the casing 9

and has a beveled gear wheel 22 thereon which meshes with a bevel gear wheel 23 on a screw shaft 24. This screw shaft has a thread thereon in the form of a ratchet and is straight at the front and beveled at the rear, as clearly illustrated in Fig. 3, for a purpose described hereinafter.

25 is the brake rod which is turned up at each end. The inner end has a brake band 26 thereon made of rubber, or other suitable material, and arranged to bear against the inner side of the flange 3 of the carrier 2. The opposite end of the brake rod is shaped to form a handhold by which it can be set.

Mounted on the rod 27, extending parallel with the screw 24, is a clutch 28 made in two sections 29 and 30, as illustrated in Fig. 9. The section 29 has teeth on its upper side which engage the screw 24, and the other section 30 has teeth on the lower side which also engage the screw 24. Each section has a projection 31.

On the brake rod 25 is a bar 32, slightly beveled at the edge, as indicated in Fig. 4, so that when the brake rod is moved toward the screw 24 it forces the sections 29 and 30 out of engagement with the threads of the screw 24. On the rod 27 is a collar 33 and between this collar and the clutch is a coiled spring 34. The spring is fastened to the collar at one end and to the section 30 of the clutch at the opposite end and, as the collar is secured to the rod 27 by a set screw and the section 29 is also secured to the shaft by a set screw, the tendency of the spring is to cause the two sections to engage the screw, but the spring will yield when the sections are forced from the screw.

Pivoted at 35 to the casing 9 is a pawl 36, shown clearly in Fig. 7, and the end 37 of this pawl enters the notch 38 in the brake rod 25, Fig. 6, so as to hold the brake rod clear of the flange 3. On the pawl is an arm 39 having a pin 40 which passes through a slot in the lever 41 mounted on a pivot pin 42 on the section 29 of the clutch and connected at 43 to a rod 44 which is attached to an arm 45 secured to the tone arm 5, in the present instance by means of a strap 46 held firmly to the tone arm by a clamp screw 47. A spring 48 bears upon the pawl 36 and the pressure can be regulated by a set screw 49, Fig. 1. A coiled spring 50 is attached at the rear end to the casing and at the forward end to a pin 51 on the brake rod, and this spring tends to force the brake rod against the flange 3 of the carrier 2 and the pressure of this spring is sufficient to prevent the mechanism from turning the carrier when the brake is applied.

The pitch of the screw 24 is less than the lowest speed of travel of the tone arm toward the center of rotation of the disk and, consequently, the pivotal connection 43 will

travel at the same speed and, in some instances, faster than the pivot 42 of the lever 41 and the section 29 of the clutch, so that the pawl 36 will remain in engagement with the brake rod 25, retaining the brake clear of the flange 3 of the carrier 2. When, however, the needle has reached the end of the record and is in the concentric groove x thereof shown by dotted lines in Fig. 1, the forward movement of the pivot connection 42 is stopped, but as the screw 24 continues to rotate due to the rotation of the parts connected with it, it will force the clutch forward and the lever 41 will turn on the pivot 43 and will force the pawl 36 out of engagement with the notch 38 of the brake rod against the pressure of the spring 48, and the spring 50 will immediately retract the brake rod, causing the brake band 26 to engage the flange 3 and at the same time the bar 32 will enter the space between the projections 31 on the sections of the clutch and will force them out of engagement with the screw. Thus the screw will turn and the rotation of the carrier 2 will be stopped.

By making the teeth of the screw 24 in the form of ratchet teeth, the clutch can be moved forward by the action of the tone arm at a greater speed than the travel of the screw, so that the device will accommodate itself to any scroll cut in the disk.

As hereinbefore remarked, the pitch of the screw is less than the finest scroll now produced.

In Fig. 10, I have illustrated means for actuating the screw from the periphery of the disk carrier. On the disk carrier is a band or flange 52 having a projection 53 which contacts with an arm 54 loose on the screw 24. On the hub of the arm are ratchet teeth engaging teeth on a collar of the screw and a spring 54^a is attached to the arm. At each revolution of the disk the screw is turned. The other mechanism is similar to that previously described.

Thus it will be seen that I am enabled to attach my improved mechanism to any talking machine in which a disk is used and by positively driving the screw by the mechanism which turns the disk carrier and by providing a clutch which engages the screw and connecting this clutch to mechanism attached to or connected with the tone horn, I can stop the rotation of the disk as soon as the record cut thereon has been completed, and the device need not be adjusted to accommodate each record as it is applied to the instrument, as it is automatic in its action.

I claim:—

1. The combination in a talking machine, of a turn table; a pivoted element; a casing; a brake arranged to prevent the rotation of the turn table; means for holding the brake out of action; a screw; means for driving the screw from the driving mecha-

nism of the turn table; a clutch engaging the screw; and means connected to the clutch and to the pivoted element for actuating the means for holding the brake out
 5 of action, the parts being so arranged that when the movement of the pivoted element is discontinued the movement of the screw will cause the means to release the brake, allowing it to be applied to stop the rotation
 10 of the turn table.

2. The combination in a talking machine, of a turn table; a pivoted element; a casing; a screw mounted in the casing; means for turning the screw from the driving mechanism of the turn table; a brake rod arranged
 15 to engage the turn table to prevent it from rotating; a pawl engaging the brake rod and holding it out of action; a clutch arranged to be traversed by the screw; and a lever
 20 pivoted to the clutch and connected to the pivoted element and engaging the pawl so that when the pivoted element is traveling over the turn table the brake will remain out of engagement with the turn table but as
 25 soon as the movement of the pivoted element is discontinued the brake will be released and applied.

3. The combination in a talking machine, of a turn table; a pivoted element; a brake
 30 arranged to be applied to the turn table to stop its rotation; a screw; means for driving the screw from the rotating mechanism of the turn table; a pawl engaging the brake and tending to hold it out of engagement
 35 with the carrier; a clutch engaging the screw and arranged to travel thereon and having a pivot; a lever mounted on the pivot; and a rod connected to one arm of the lever and to the pivoted element, the other arm of the
 40 lever engaging the pawl so that when the pivoted element is traveling over the turn table the pawl will remain in engagement with the brake rod, keeping it out of engagement with the turn table, but when the
 45 travel is stopped the pawl will be forced out of engagement with the brake rod and will be released and will clamp the turn table, preventing further rotation thereof.

4. The combination in a talking machine, of a turn table; a pivoted element; a casing; a screw mounted in the casing, the threads of the screw being straight at the front and beveled at the rear; means for driving the screw from the rotating mechanism of the machine; a nut arranged to slide
 50 parallel with the screw and to engage the said screw; a brake rod; a pawl engaging the said rod; a lever pivoted to the nut and connected to the pawl; and means for connecting said lever with the pivoted element, the nut yieldingly engaging the screw so
 60 that when the nut travels faster than the screw it will slip over the screw.

5. The combination in a talking machine, of a turn table; a pivoted element; a screw;

means for driving the screw from the turn table; a rod arranged parallel with the screw; a two-part clutch in the form of a nut engaging the screw, one of said parts
 70 being secured to the rod and the other being loose thereon; a collar secured to the rod; a spring mounted on the rod, one end of the spring being attached to the collar and the other end being attached to the section of the clutch which is loose on the rod;
 75 a brake rod; a pawl engaging the brake rod; and a lever adapted to one part of the clutch, one arm of the lever engaging the pawl and the other arm engaging the pivoted element.

6. The combination in a talking machine, of a turn table; a pivoted element; a casing; a screw shaft mounted therein; means for driving the shaft from the turn table; a rod
 80 extending parallel with the screw; a two-part clutch mounted thereon and engaging the screw, each part of the clutch having an extension; a brake rod arranged to engage the turn table and having a bar arranged to enter the space between the two
 85 projections of the clutch and holding the clutch out of engagement with the screw; a pawl engaging the brake rod; a lever pivoted to the clutch and engaging the pawl; and an arm connecting the lever with the
 90 pivoted element.

7. The combination in a talking machine, of a turn table; a pivoted element; a shaft projecting through the base of the machine and upon which the turn table is mounted;
 100 a bearing through which the shaft extends; a gear wheel mounted in the bearing; a transverse pin on the shaft engaging the gear wheel so that it will turn with the shaft; a casing secured to the base; an arm
 105 connecting the casing with the bearing; a shaft having a gear wheel thereon meshing with the first mentioned gear wheel; a second shaft coupled to the last mentioned shaft and having a beveled gear wheel at
 110 one end; a screw mounted in the casing also having a beveled gear wheel; a clutch engaging the screw; a brake rod; a pawl retaining the brake rod out of contact with the carrier; a lever pivoted to the clutch
 115 and engaging the pawl; and an arm connected to the lever and to the pivoted element.

8. The combination in a talking machine, of a turn table having a head; a pivoted
 120 element; a driven shaft projecting through the base and on which the turn table is mounted; a casing secured to the base; an arm projecting from the casing; a bearing on the end of the arm through which the
 125 driven shaft extends; a gear wheel mounted in the bearing and arranged to receive the hub of the turn table; a screw shaft in the casing; gearing between the screw shaft and the driven gear wheel; a brake rod; a
 130

spring tending to force the brake rod
against the turn table; a pawl for retaining
the brake rod clear of the turn table; a
clutch engaging the thread of the screw; and
5 a lever pivoted to the clutch and connected
to the pawl and also connected to the piv-
oted element of the machine.

In testimony whereof, I have signed my
name to this specification, in the presence
of two subscribing witnesses.

JAMES W. HUGHES.

Witnesses:

WM. E. SHUPE,

WM. A. BARR.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

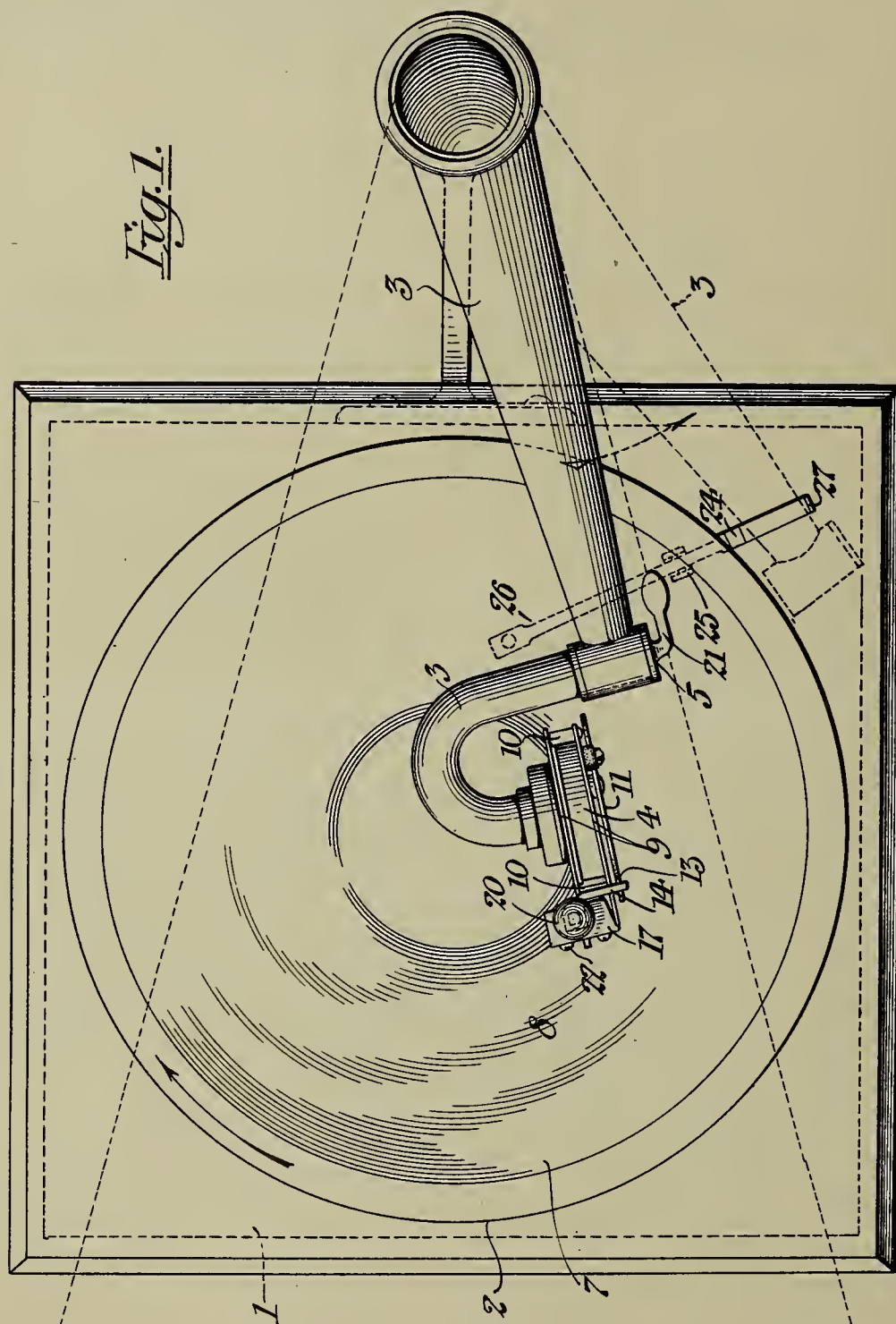
PHONOGRAPH PATENT.

PHONOGRAPH STOP,
1,175,912-----M. Adair,
Patented-March 21st, 1916.
Filed-January 11th, 1915.

M. ADAIR.
 PHONOGRAPH STOP.
 APPLICATION FILED JAN. 11, 1915.

1,175,912.

Patented Mar. 21, 1916.
 3 SHEETS—SHEET 1.

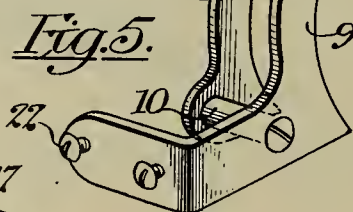
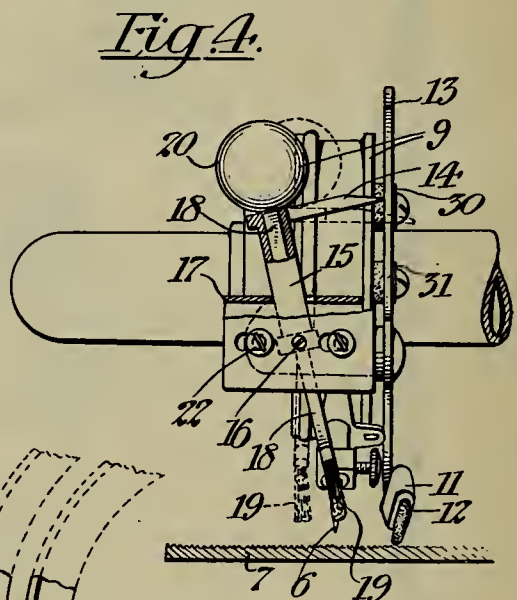
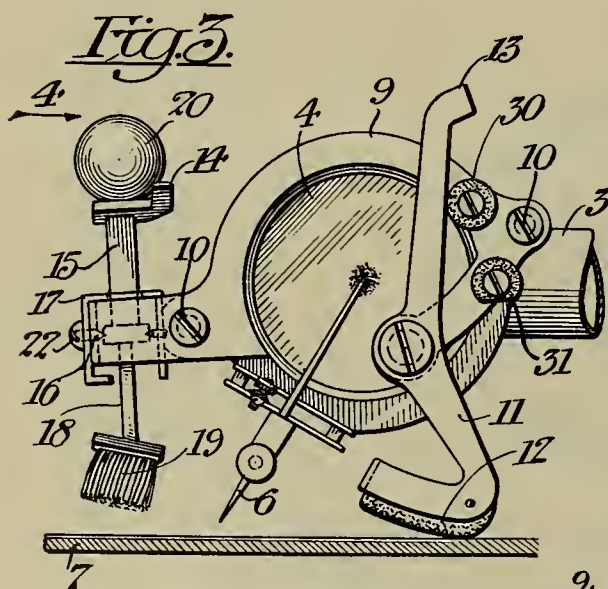
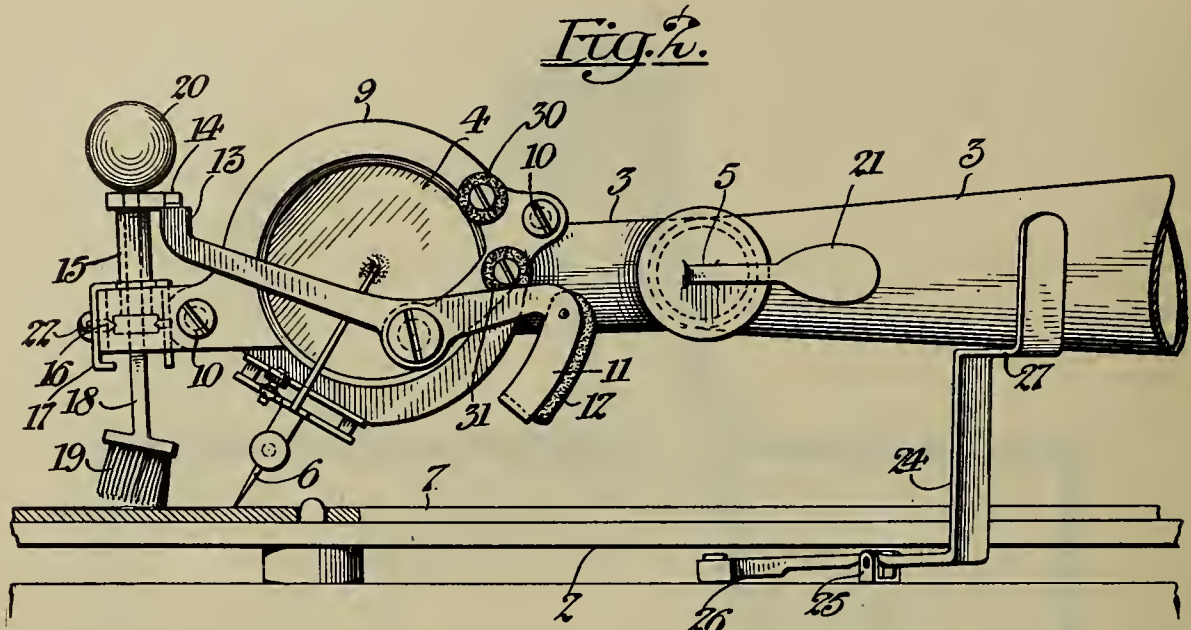


Witnesses:
Felix H. Jones,
Rita Lynch

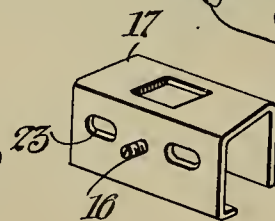
Inventor
Montague Adair
 By *his* Attorneys
Wm. V. Becken

1,175,912.

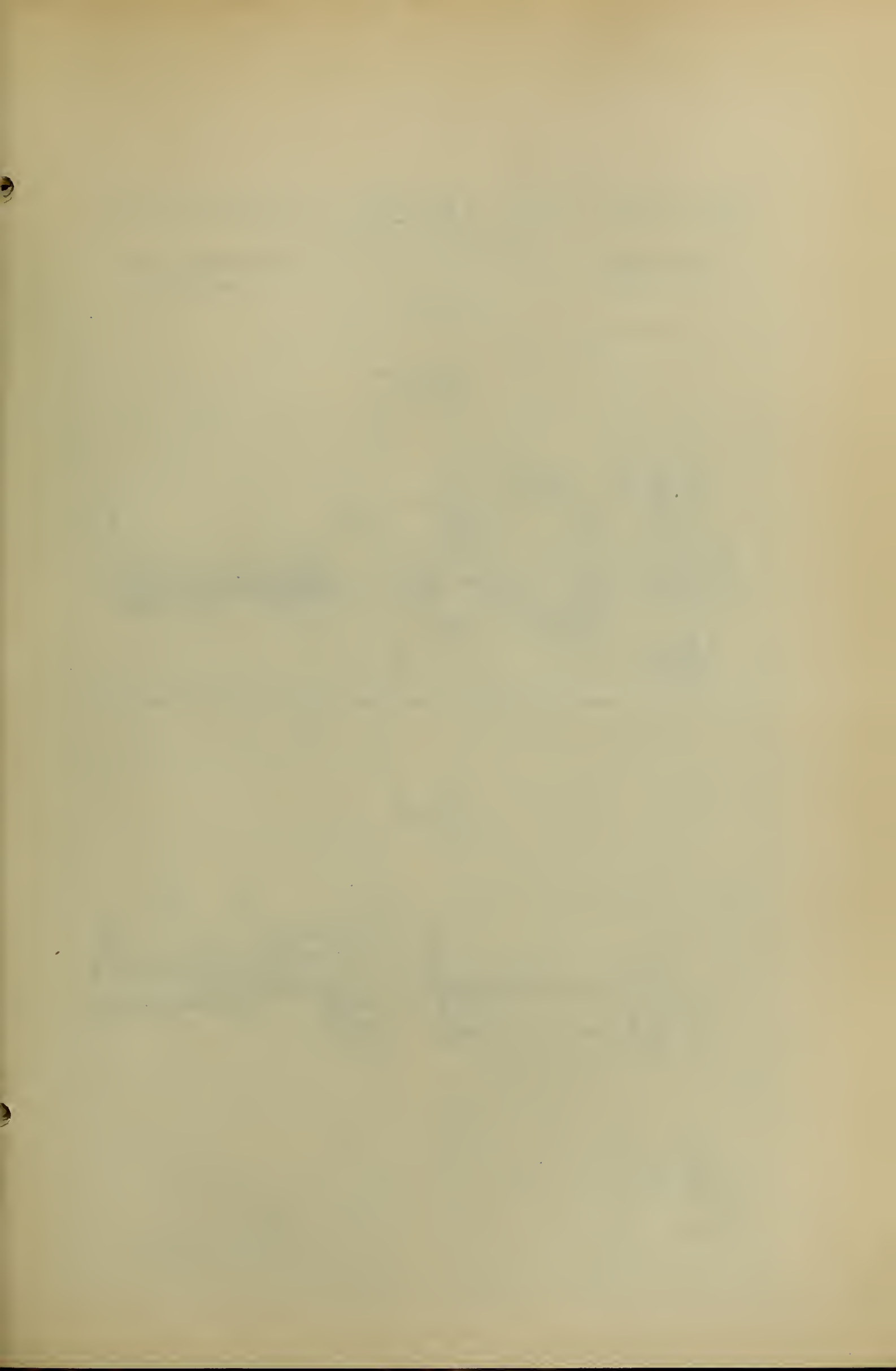
Patented Mar. 21, 1916.
 3 SHEETS—SHEET 2.



Witnesses:
Titus H. Jones
Rita Lynch



Inventor
Montague Adair
 By *his* Attorney
Wm. V. Becken



M. ADAIR.
PHONOGRAPH STOP.

APPLICATION FILED JAN. 11, 1915.

1,175,912.

Patented Mar. 21, 1916.

3 SHEETS—SHEET 3.

Fig. 7.

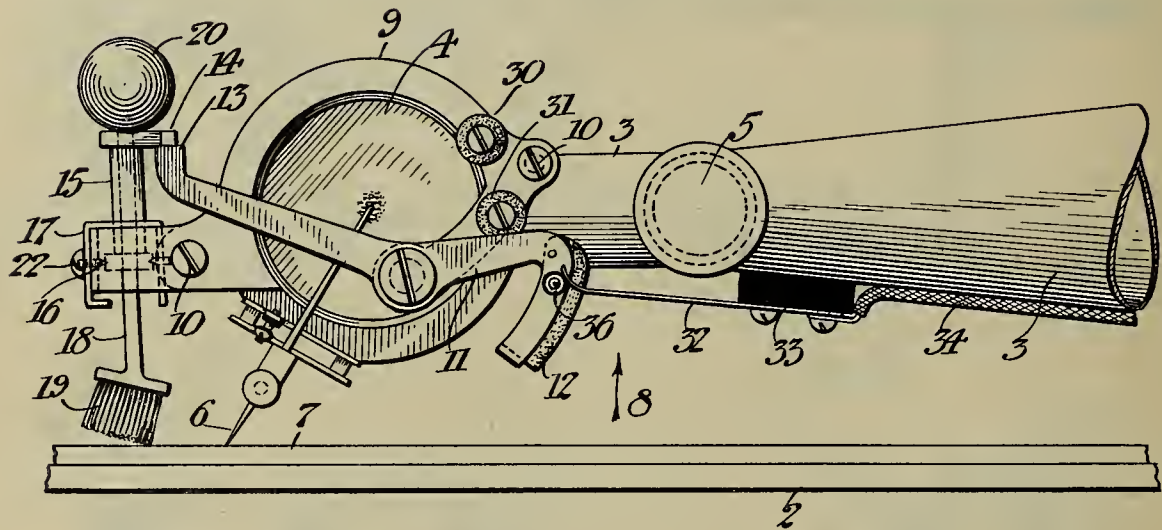
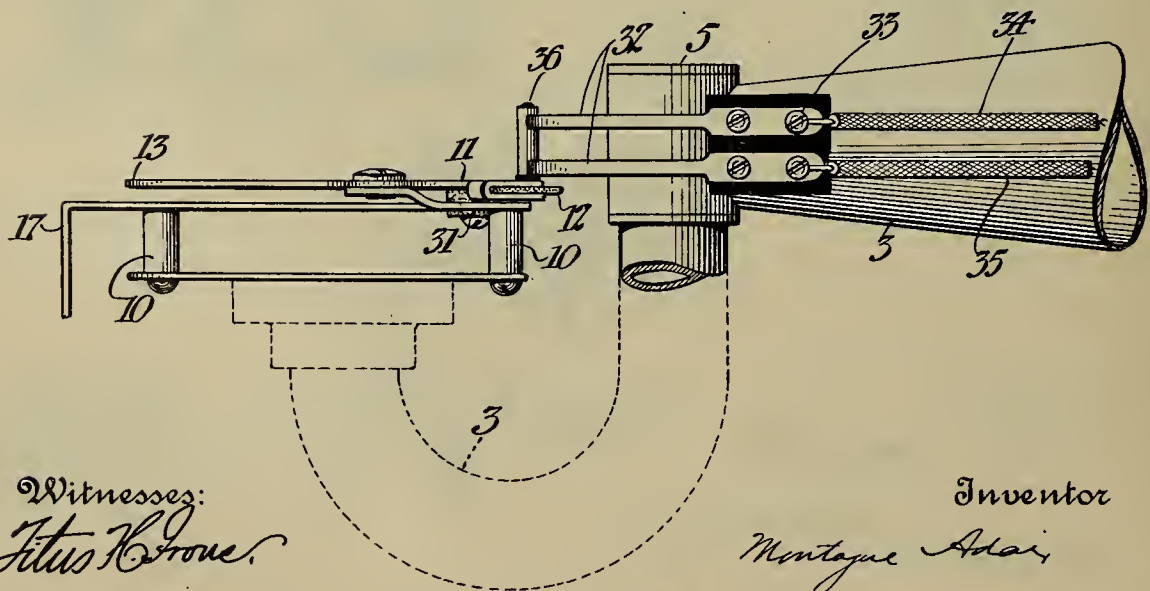


Fig. 8.



Witnesses:
Titus K. Brown
Rita Lynch

Inventor
Montague Adair
By *Attorney*
W. H. Becken

UNITED STATES PATENT OFFICE.

MONTAGUE ADAIR, OF NEW YORK, N. Y.

PHONOGRAPH-STOP.

1,175,912.

Specification of Letters Patent.

Patented Mar. 21, 1916.

Application filed January 11, 1915. Serial No. 1,556.

To all whom it may concern:

Be it known that I, MONTAGUE ADAIR, a citizen of the United States, and a resident of the borough of Brooklyn, in the county of Kings, city and State of New York, have invented certain new and useful Improvements in Phonograph-Stops, of which the following is a specification.

The present invention relates generally to a stop mechanism for phonographs or the like in which there is a rotatable element carrying a record having a zone of grooves, and a movable element which has a motion with respect to said rotatable element during the operation of the machine.

It is well known that the extent of the zone of grooves of the record varies and in the stopping devices heretofore employed it has usually been the practice to adjust such stopping device to correspond with the extent of the groove zone prior to playing the record, the machine thereby automatically stopping when the end of the record is reached.

It is the main object of this invention to provide means whereby such adjustment, to fit it to each individual record, will be rendered unnecessary so that the machine will stop automatically when the end of the record is reached, irrespective of the extent of the zone of grooves.

In carrying out this and other objects the invention is characterized by a controller which is carried by the movable element and which by its engagement with the grooves of the record will control the moment that the braking element shall be permitted to operate. Preferably the braking element is also carried by the movable element and is under the influence of a latch which normally restrains its action, said latch being in turn controlled by the controller engaging the record.

It is clear that the controller must be of a peculiar character in order to obtain this result in a practical manner. The necessary characteristics of this controller are that it must be non-playing, that is to say, its engagement with the record grooves must not produce a tune or a scratch; it must not injure the record; it must not retard the rotation of the rotatable member; it must not

sensibly increase the pressure with which the sound reproducing stylus engages the record. To this end I have found that a brush makes an ideal non-playing follower for controlling the braking element in that it possesses all the characteristics above enumerated and has in addition the further characteristic that it cleans the record as the latter passes underneath the brush. This brush will preferably be set with its bristles slightly inclined and with their ends extending in the direction of rotation of the rotatable member so as to produce a soft and yielding engagement with the record.

The braking element controlled by the controller is preferably mounted on the movable element such as the swinging arm in such a way that it has a pivotal movement when engaging the record, said pivotal movement being of such a character that the braking element swings into engagement with the record in the direction of rotation of the record so that the rotation of the record once the braking element has initially engaged the same will of itself serve to additionally clamp the braking element more securely into position.

Other features of construction, arrangement of parts and combination of elements will appear as the specification proceeds.

In the accompanying drawings the invention is illustrated in a preferred form from which form departures may be made within the scope of the invention as expressed in the appended claims.

In the said drawings: Figure 1 is a conventional representation in plan of an ordinary phonograph showing the invention applied thereto. Fig. 2 is a side elevation of both braking devices showing their relation to the rotatable element and to the record carried thereby, as well as to the movable element or swinging arm. Fig. 3 is a view of the end of the movable element or swinging arm and sound reproducer showing the braking element in its released position. Fig. 4 is a view looking in the direction of the arrow 4, Fig. 3. Fig. 5 is a detail view of the means for securing the braking element to the swinging arm. Fig. 6 is a detail view of an adjustable member for properly positioning the controller with re-

spect to the sound reproducing stylus. Fig. 7 is a side elevation of a modified form of the invention showing a cut-out or switch for use when an electric motor is employed to operate the rotatable element. Fig. 8 is a view looking in the direction of the arrow 8, Fig. 7.

Similar characters of reference indicate corresponding parts in the different views.

1 indicates a phonograph of the usual type having the rotatable element or record carrier 2 operated in the usual manner and having the movable element or swinging arm 3 carrying at its outer end the sound box 4 of the conventional type, said sound box being pivotally supported on the center 5 in a well known manner and having a sound reproducing stylus 6 which engages the grooves of the record 7 in the usual manner. The record 7 has a zone of grooves 8 the extent of which varies with the length of the different records to be played.

9 indicate two brackets which are slipped over the sound box 4 and which are held in position on the said sound box and connected together by means of transverse bolts as 10. Pivotally supported on these brackets is a braking element 11, one arm of which carries a brake shoe 12 of rubber or other similar material, which brake shoe is adapted to engage the record to stop the rotation of the rotatable element. It will be observed from Fig. 3 that when the said braking element swings down into engagement with the record from the position it occupies in Fig. 2, the swinging movement is in the same direction as the direction of rotation of the rotatable element so that once this brake shoe engages the record any rotation of the said rotatable element will thereafter serve to clamp the brake shoe more firmly in engagement with the record and will thereby stop the rotation of the rotatable element. Normally and during the time that the record is being played, the braking element 11 is in the position shown in Fig. 2. When in that position the arm 13 of the braking element 11 is held latched by the latch 14. This latch is carried by a tilting frame or guide 15 pivotally supported at 16 in the member 17 of the brackets 9. Extending through the tilting guide 15 is the follower 18 provided at its lower end with the brush 19 which is set with its bristles at a slight incline with their ends extending in the direction of rotation of the rotatable element as shown. The upper end of the member 18 carries a weight 20 and the lengths of the member 18 and of the guide 15 with respect to each other, as well as the disposition of the weight 20, is such that this weight preferably does not bear against the guide 15 but is exerted wholly on the brush 19. This brush or follower 19 engages the record grooves and is of sufficient stability to maintain the tilting

guide 15 in a substantially vertical position with a slight bias to one side, as indicated in dotted lines in Fig. 4.

30 and 31 indicate two stops for limiting the movement of the braking element 11.

When it is desired to play a record the sound reproducing stylus 6 is placed in engagement with the record as usual and the braking element 11 is elevated and its arm 13 brought in under the latch 14, thereby bringing the non-playing follower 19 into a substantially vertical position and causing the said non-playing follower 19 to engage the record grooves at the same time that the sound reproducing stylus 6 is placed in engagement with the record. Upon the rotation of the record the swinging arm 3 moves across the zone of grooves in the usual manner under the traveling influence of the sound reproducer 6 and the non-playing follower 19 likewise follows the grooves until the swinging arm 3 has moved across the zone of grooves sufficiently to bring the non-playing follower 19 to the edge of the groove zone. The swinging arm 3 will now continue its transverse movement but the non-playing follower or controller 19 will have a tendency to cling to the edge grooves, that is, those grooves which are adjacent to the smooth central portion of the record. These will gradually cause the guide 15 to tilt until the weight 20 overbalances it, thereby releasing the arm 13 of the braking element 11, which latter thereupon descends by reason of gravity or otherwise into engagement with the record, stops the machine, and elevates the sound reproducing stylus out of engagement with the record.

In order to counterbalance any slight additional weight that might be placed on the sound box, a counterweight 21 may be mounted on the center 5. The member 17 (Fig. 6) is secured to the brackets 9 by means of the set screws 22 which pass through the elongated slots 23 so that the distance laterally between the sound reproducing stylus 6 and the non-playing follower may be properly determined. This adjustment is made practically once for all.

By the above means it will be observed that, irrespective of the extent of the zone of grooves in the record, the rotatable element 2 will be automatically stopped when the movable element or swinging arm has moved across the said zone of grooves and that no adjustment is necessary for each record which it is desired to play.

The auxiliary braking device 24 is pivoted at 25 and has a braking element 26 extending in under the rotatable element 2 and normally in its lower position by reason of its own weight. Carried by the other end of the device 24 is a support 27 which extends up at a point adjacent to the rotatable element and in such a position that when the

movable element or swinging arm 3 is moved out of playing position it will naturally depress the supporting member 27, thereby causing the braking element 26 to
 5 move upwardly into engagement with the rotatable element 2. When the arm 3 is removed from the supporting member 27 the rotatable element 2 will commence to rotate and will be up to proper speed by the time
 10 the operator places the sound reproducer in engagement with the record. The record is then played and the rotatable element is automatically stopped and the sound reproducing stylus elevated by the braking element 11 after which the movable element
 15 or swinging arm is moved into position on the supporting member 27 and the rotatable member held against rotation. This renders the usual manually operated stop unnecessary in that the mere removal of the
 20 movable element or swinging arm from playing position operates a brake, while its removal into playing position releases the brake.

25 In the modification shown in Figs. 7 and 8 the movable member or swinging arm 3 is provided with two terminals 32 which are carried by the insulation piece 33 suitably attached to said swinging arm. To these
 30 terminals lead the conductors 34 and 35, one of which may pass to an electric motor and the other to the line. Secured to the braking element 11 is a circuit closer 36 suitably insulated therefrom and adapted when the
 35 sound reproducing stylus is in engagement with the record and the braking element 11 is in its latched position to bridge the two terminals 32, thereby completing the circuit through the motor. Upon the releasing of
 40 the latch 14 and upon the downward movement of the braking element 11 into engagement with the record, the circuit closer 36 moves out of engagement with the two terminals 32 and ruptures the circuit through
 45 the motor. In this form of the invention the braking element may be unnecessary since the rupture of the circuit will eventually bring the rotatable element to a stop. Also in this form of the invention it will not
 50 be necessary to employ the auxiliary braking element 26.

What is claimed, is:

1. A stop mechanism for a machine having a rotatable element carrying a record
 55 having a zone of grooves, and a movable element, comprising: a braking element carried by the movable element and normally inactive, and means controlled by the groove zone irrespective of its extent for causing
 60 the braking element to stop the rotation of the rotatable element when the movable element has moved across said zone.

2. A stop mechanism for a machine having a rotatable element carrying a record
 65 having a zone of grooves, and a movable

element, comprising: a braking element carried by the movable element normally inactive, and a latch for said braking element adapted to engage the grooves of the record
 70 to hold it in its latched position and to release the braking element when the movable element has moved across the zone of grooves irrespective of the extent of said zone.

3. A stop mechanism for a machine having a rotatable element carrying a record
 75 having a zone of grooves, and a movable element, comprising: a braking element carried by the movable element normally inactive, and a tilting latch for said braking
 80 element having a normal bias in one direction to release the braking element, and a follower engaging the grooves of the record to prevent said latch from tilting until the
 85 movable element passes across the zone of grooves.

4. A stop mechanism for a machine having a rotatable element carrying a record
 90 having a zone of grooves, and a movable element, comprising: a braking element normally inactive, a latch for normally holding said braking element inactive, and a non-
 95 playing follower engaging the grooves of the record for holding said latch in its latched position until the movable element
 100 has moved across the groove zone.

5. A stop mechanism for a machine having a rotatable element carrying a record
 105 having a zone of grooves, and a movable element, comprising: a braking element carried by the movable element, a latch for normally holding said braking element inactive
 110 also carried by the movable element, and means controlled by the extent of the groove zone for releasing the latch when the movable
 115 element has traveled across the groove zone irrespective of the extent of the latter.

6. In a stop mechanism for a machine having a rotatable element carrying a record
 120 having a zone of grooves, and a movable element, a braking element pivotally supported on the movable element and having a movement swinging it into engagement with the record in the same direction as the
 125 rotation of the record, a latch for holding said braking element inactive, and means controlled by the zone of grooves for automatically releasing the latch when the end
 130 of the record is reached regardless of the extent of the zone of grooves.

7. In a stop mechanism for a machine having a rotatable element carrying a record
 135 having a zone of grooves, and a movable element, a braking element, and a latching and releasing device comprising: a tilting
 140 member having a bias in one direction, and a non-playing follower engaging the record grooves controlling said tilting member.

8. In a stop mechanism for a machine having a rotatable element carrying a record
 145

having a zone of grooves, and a movable element, a braking element, and a latching and releasing device comprising: a tilting guide, a stem passing through said guide, a non-playing follower on the lower end of said stem, and a weight on the upper end of said stem.

9. In a stop mechanism for a machine having a rotatable element carrying a record
10 having a zone of grooves, and a movable element, a braking element, and a latching and releasing device comprising: a tilting guide, a stem passing through said guide, a

non-playing follower on the lower end of said stem, a weight on the upper end of said stem, brackets on the movable element, and an adjustable member on the brackets for supporting the tilting guide. 15

Signed at New York, in the county of New York and State of New York, this 8th 20 day of January, A. D. 1915.

MONTAGUE ADAIR.

Witnesses:

MARY W. WALLACE,
AXEL V. BEEKEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPHOPHONE PATENT.

DIAPHRAGM FOR SOUND REPRODUCERS,
1,176,326-----J. H. Sutlive,
Patented-March 21st, 1916.
Filed-August 7th, 1916.

J. H. SUTLIVE.
DIAPHRAGM FOR SOUND REPRODUCERS.
APPLICATION FILED AUG. 7, 1914.

1,176,326.

Patented Mar. 21, 1916.

Fig. 1.

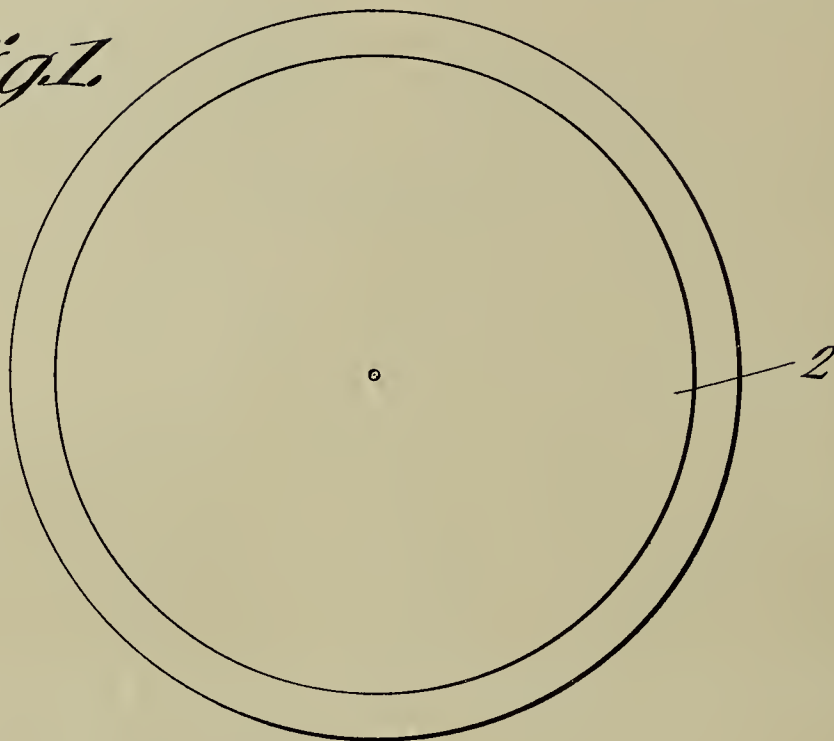


Fig. 2.

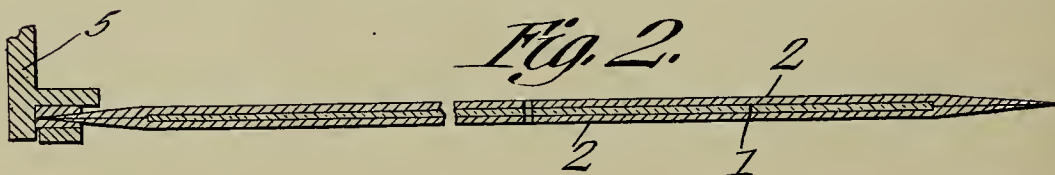


Fig. 3.

J. H. Sutlive

Inventor

Witnesses

J. P. Somers
Marian Moore

by

C. A. Snow & Co.
Attorneys

UNITED STATES PATENT OFFICE.

JAMES H. SUTLIVE, OF KEOKUK, IOWA.

DIAPHRAGM FOR SOUND-REPRODUCERS.

1,176,326.

Specification of Letters Patent.

Patented Mar. 21, 1916.

Application filed August 7, 1914. Serial No. 855,667.

To all whom it may concern:

Be it known that I, JAMES H. SUTLIVE, a citizen of the United States, residing at Keokuk, in the county of Lee and State of Iowa, have invented a new and useful Diaphragm for Sound-Reproducers, of which the following is a specification.

This invention relates to diaphragms for sound reproducers, one of its objects being to provide a composite diaphragm whereby the vibration is distributed practically equally over the entire diaphragm and, consequently, the harsh tones so often produced during the reproduction of high tones are avoided while at the same time all tones reproduced are much more natural because of the larger vibrating surface.

A further object is to provide a diaphragm which can be substituted readily for those now in use.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, can be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings:—Figure 1 is a plan view of a diaphragm constructed in accordance with the present invention. Fig. 2 is an enlarged section therethrough. Fig. 3 is an enlarged section through a modified form of diaphragm.

Referring to the figures by characters of reference 1 designates a center disk of mica or other suitable stiff material and this disk is interposed between two layers of softer material such as raw-hide, these layers being indicated at 2 and being of a greater diameter than the disk 1. In assembling the parts a suitable adhesive is applied to the inner faces of the raw-hide disks 2 and these disks, with the center disk interposed between them and concentric therewith, are placed within a press and subjected to pressure so that the three disks will be held tightly together, the raw-hide disks being brought to a knife edge at their peripheries and coming together close to the center disk

1 at a point approximately equidistant from the two faces of said disk 1 and as shown in Fig. 2.

The diaphragm such as herein described is placed in a sound box and secured in the usual manner, the raw-hide disks 2 being engaged by the sound box, serving to support the center disk 1 as shown in Fig. 2. Thus it will be seen that when the diaphragm is set in vibration, the soft or more readily flexible material projecting beyond the periphery of the disk 1 will permit the diaphragm to vibrate equally practically throughout its diameter so that the harshness or blasting heretofore produced because of the insufficient vibration of the diaphragm is eliminated and a clear and better tone produced.

It has been found that under some conditions the disks can be of the same diameter as shown in Fig. 3, wherein the mica disk has been shown at 3 and the raw-hide or other soft disks at 4. The best results, however, are obtained by extending the outer disks beyond the periphery of the inner or mica disk so that they alone will be clamped to the sound box.

In Fig. 2, a portion of the sound box has been illustrated at 5.

What is claimed is:—

1. A diaphragm for sound reproducers, including a relatively stiff disk, and thin disks of rawhide affixed to opposed faces respectively of said relatively stiff disk and projecting beyond the periphery thereof, the projecting portions of the rawhide disks being affixed to each other.

2. A diaphragm for sound reproducers, including a relatively stiff disk, and thin disks of rawhide affixed to opposed faces respectively of said relatively stiff disk and projecting beyond the periphery thereof, the projecting portions of the rawhide disks being affixed to each other, said rawhide disks being of equal tension and adhering with equal tenacity to the first named disk, thereby to maintain the diaphragm normally in its intermediate position.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JAMES H. SUTLIVE.

Witnesses:

G. W. GLIDDEN,
S. H. CHESNUT.

UNITED STATES PATENT OFFICE

OFFICE OF THE COMMISSIONER OF PATENTS

WASHINGTON, D. C.

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UNITED STATES PATENT OFFICE

[The following text is extremely faint and largely illegible. It appears to be a patent document, possibly containing a description of an invention and a list of references. The text is organized into two main columns.]

[Left Column - Possible Description of Invention:]

1. A method of...
2. A device for...
3. A system of...
4. A process of...
5. A machine for...
6. A material of...
7. A structure of...
8. A component of...
9. A part of...
10. A feature of...

[Right Column - Possible References:]

1. ...
2. ...
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8. ...
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[Bottom Section - Possible Claims:]

1. ...
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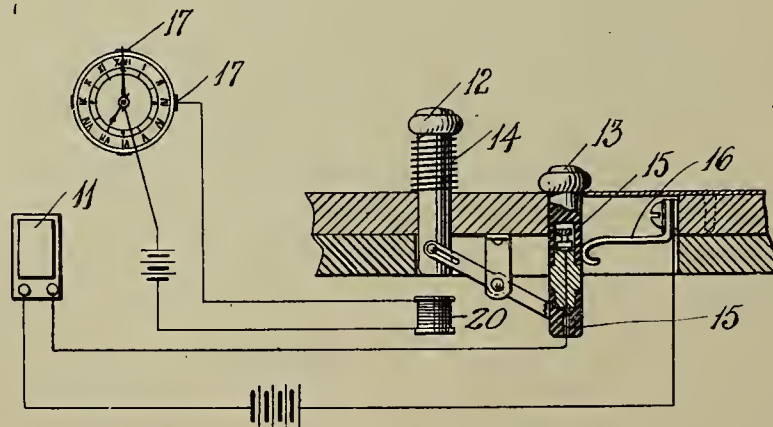
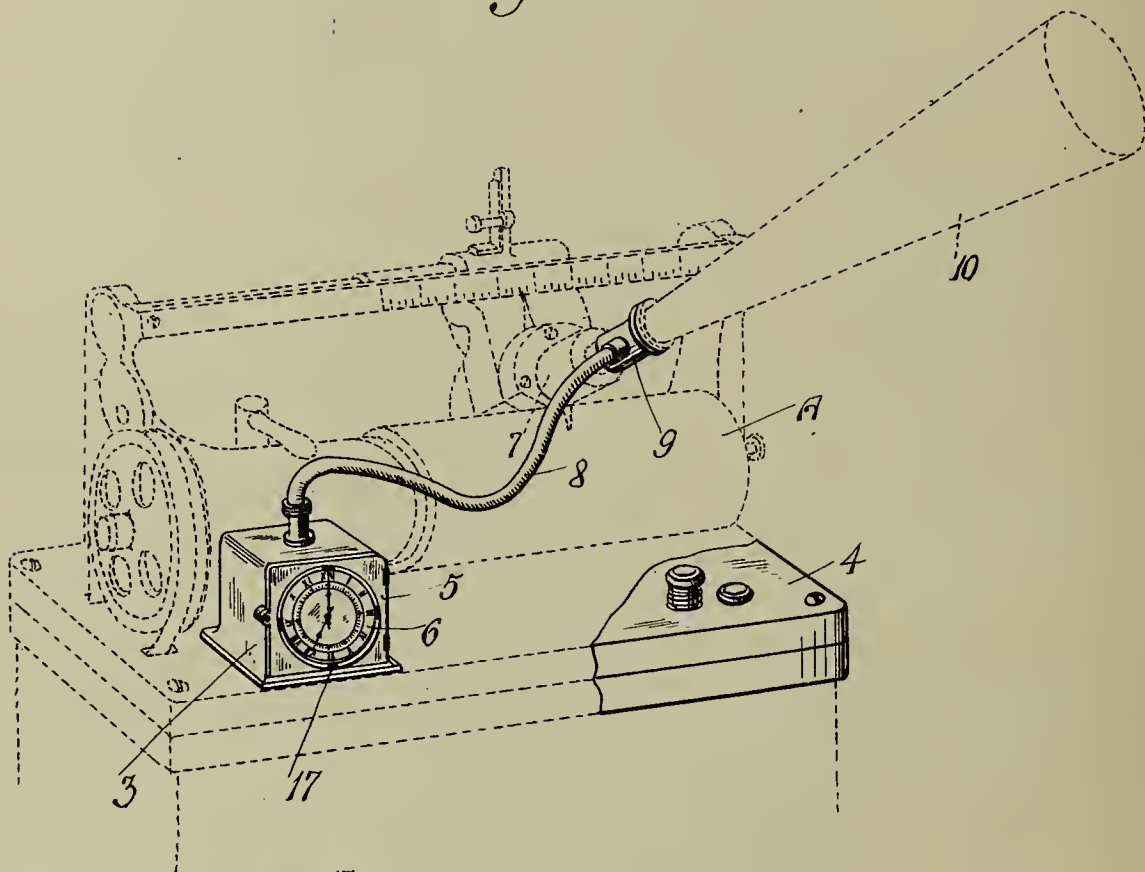
TIMEKEEPER DEVICE,
#1,176,919-----D. Nemeth,
Patented-March 28, 1916.
Filed-March 12, 1915.

D. NEMETH.
TIMEKEEPER DEVICE.
APPLICATION FILED MAR. 12, 1915.

1,176,919.

Patented Mar. 28, 1916.

Fig. 1.



WITNESSES:
Fred. Rogers
Alexay Alora

Fig. 2.

INVENTOR.
Dezso Nemeth
BY *Alexander Hines*
his ATTORNEY.

UNITED STATES PATENT OFFICE.

DEZSO NEMETH, OF NEW YORK, N. Y.

TIMEKEEPER DEVICE.

1,176,919.

Specification of Letters Patent.

Patented Mar. 28, 1916.

Application filed March 12, 1915. Serial No. 13,911.

To all whom it may concern:

Be it known that I, DEZSO NEMETH, a subject of the King of Hungary, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Timekeeper Devices, of which the following is a specification.

This invention relates to a timekeeper device and has as its object to provide means for registering the time at which employees enter and leave their place of employment in an easy and simple way.

A further object of the invention is to provide a device of this character producing a record of the time of the employees entering and leaving the place of employment which may easily be read and a time sheet be prepared based thereon without any intricate work.

With the foregoing and other objects in view, the invention consists substantially in the combination of a recording phonograph of the Edison type with a clock striking the required divisions of time on a bell so as to record the sound thereof on a cylinder applied to the phonograph and with a mechanism adapted to prevent misuses.

In the accompanying drawing: Figure 1 is a perspective view of a phonograph with a device constructed according to this invention applied thereto. Fig. 2 is a diagram of the electrical means used in the device, showing also details of the latter, partly in section and partly in elevation.

The same part is designated by the same reference character throughout the different views.

Referring more particularly to the drawing, 3 is a casing mounted on the top 4 of the phonograph case, having a transparent front door 5 which may be locked so as to prevent any tampering with the mechanism placed inside the casing 3, where is placed a clock 6 which strikes, preferably, every quarter of an hour. The sound thus produced is transmitted to the recording diaphragm 7 by means of a flexible tube 8 connected to the casing 3 and to the attachment 9 of the diaphragm 7 which carries the speaking horn 10. The diaphragm records the sound on the cylinder A. Within the casing 3 is further placed a buzzer 11 electrically connected with the start-and-stop device of the phonograph, as hereinafter described and the sound produced thereby is

recorded on the cylinder A in the same way as above described with regard to the striking of the clock.

The start-and-stop device is the same as generally used in phonographs, viz: a button pressed down starts the phonograph and another button pressed down stops it, the two buttons being so connected that when one is pressed down the other is necessarily forced up. In the present invention, the starting button 12 is provided with a helical coil spring 14 around its stem tending to keep it in the position indicated in the drawing, in which position the phonograph stands still. In order to start it and keep it going the button 12 must be pressed down and held there. As soon as it is released, the spring 14 will force it up and stop the phonograph. The other button 13 is so constructed that a portion at about midway of its height is of conducting material electrically connected to the buzzer 11 whereas the remainder of the button 13 is covered with insulating material 15. A connector 16 is so placed in respect to the button 13 that it closes an electrical circuit to the buzzer 11 whenever the button 13 is midway between its lowest and highest position, as is obvious from the drawing. By this arrangement, whenever the phonograph is started or stopped, a short buzz will be produced within the casing 3 and the sound recorded on the cylinder A.

Electrical contacts 17 are placed around the outer periphery of the dial of the clock 6 adapted to be touched by the long hand of the clock when it is passing over same. The contacts 17 are so placed that the hand touches them a little before striking of the respective division of time and remains in contact therewith a little after the clock has struck. The contact of the hand with the contactors 17 closes a circuit into which is coupled a magneto 20 placed under the lower end of the button 12, at a suitable distance therefrom which, on each closing of the circuit draws down the button 12 and thereby starts the phonograph, whereas after breaking of the circuit the button 12 will be released and the phonograph stopped. By these means it is secured that the phonograph be automatically set in motion while the clock is striking.

The operation of the above described device is as follows: The employee on entering and on leaving the place of employment

starts the phonograph by pressing down the button 12, thereby producing a buzzing sound which is recorded on the cylinder A. Then he tells his name and number into the speaking horn 10, which is also recorded on the cylinder A. Finally he releases the button 12 and thus stops the phonograph, at the same time producing again a buzzing sound recorded on the cylinder A. The clock strikes at the required intervals, the sound produced thereby being also recorded and the names of the employees between two such sounds indicate those who came or left in the respective period. The time-sheet clerk on making up his time-sheet has the cylinder played on a reproducing phonograph and notes down the names and numbers of the employees with the respective periods of their arrival or leaving. He takes care to ascertain that each name and number be preceded and followed by the sound of the buzzer. The watchman at the door, near which the time-keeper device is placed, will see to it that none of the employees make more than two buzzing sounds. Misuses may also be detected by checking the voices of the employees. The date may be either recorded on the cylinder each morning through the speaking horn or it may be labeled. Of course, each cylinder may be used several times.

I claim:

1. The combination with a recording phonograph and an electrical buzzer, of a switch

controlling said phonograph, means combined with one member of said switch for normally maintaining it in an inoperative position, an electric circuit for said buzzer, said circuit including the second member of said switch, and a make and break contact arranged therewith midway in the length of the second member of said switch whereby said buzzer is caused to operate momentarily at the beginning and at the cessation of operation of said phonograph.

2. The combination with a recording phonograph, an electric buzzer and a clock, of a switch controlling the operation of said phonograph, said switch having a spring combined holding it normally open, a contact movable with said switch, a fixed contact adapted to engage said movable contact as it is moved past, an electric circuit embracing said movable and fixed contacts and said buzzer whereby the latter is actuated by the operation of said switch, a plurality of fixed contacts on said clock, a movable contact carried by the lever hand thereof, a second electric circuit embracing the fixed and movable contacts on said clock, means combined therewith for actuating said switch whereby the phonograph is caused to operate and means for conveying the sound of said buzzer and said clock to said phonograph.

DEZSO NEMETH.

Witnesses:

MIKEL MALIESIATIS,
HEINZ FROSMEL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH PATENT.

DIAPHRAGM,

1,177,025-----J. H. Ellis,

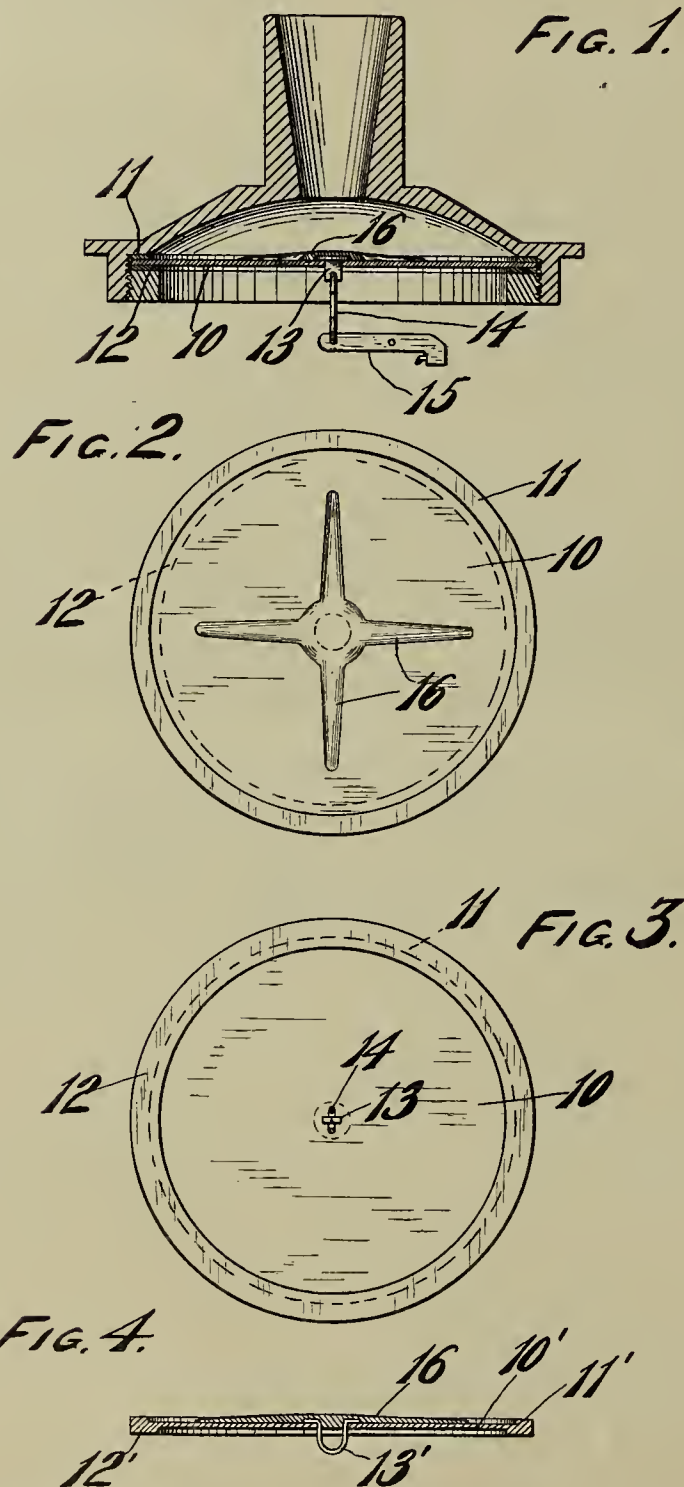
Patented-March 28th, 1916.

Filed-April 26th, 1911.

J. H. ELLIS.
 DIAPHRAGM.
 APPLICATION FILED APR. 26, 1911.

1,177,025.

Patented Mar. 28, 1916.



WITNESSES.
 L. G. Thuermer.
 Laura A. Kelley

INVENTOR.
 James H. Ellis
 By Morsell & Caldwell.
 ATTORNEYS.

UNITED STATES PATENT OFFICE.

JAMES H. ELLIS, OF MILWAUKEE, WISCONSIN.

DIAPHRAGM.

1,177,025.

Specification of Letters Patent.

Patented Mar. 28, 1916.

Application filed April 26, 1911. Serial No. 623,521.

To all whom it may concern:

Be it known that I, JAMES H. ELLIS, a citizen of the United States, residing in Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Diaphragms, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention has for its object to provide a diaphragm for talking machines and the like which will possess to a superior degree the property of responding accurately to its actuating influences, whether they be sound vibrations, in the case of a recorder, or surface undulations or variations, in the case of a reproducer.

I have found by experiment that a diaphragm excelling in its recording and reproducing properties may be made of celluloid without having the usual objection of diaphragms of other material, of producing false metallic tones or harsh and rasping tones, but which, on the other hand is capable of reproducing sound with all of its original value and expression, entirely free from false effects.

Another object of this invention is to provide a diaphragm of a novel construction whereby cushioning gaskets of rubber or the like material may be entirely dispensed with, thus avoiding the depreciation in efficiency of the instrument due to their deterioration.

Another object of this invention is to so construct the diaphragm that it will vary in its flexibility from its periphery toward its center, with its greatest flexibility near its edge, whereby a greater area of vibration is secured.

With the above and other objects in view the invention consists in the diaphragm as herein claimed and all equivalents.

Referring to the accompanying drawings in which like characters of reference indicate the same parts in the different views: Figure 1 is a sectional view of a sound box for sound recording or reproducing machines with a diaphragm constructed in accordance with this invention; Fig. 2 is a top view of the diaphragm; Fig. 3 is a bottom view of the diaphragm; and, Fig. 4 is a sectional view of the diaphragm showing a modified construction.

In these drawings 10 indicates a diaphragm comprising a thin sheet of celluloid.

I have experimented with sheet celluloid of various thickness, but find that the thickness of approximately fifteen one thousandths of an inch is most suitable for the purpose. A celluloid diaphragm, whether possessing the features of construction herein disclosed or not, is found to possess the desirable characteristics above mentioned, and therefore I do not wish to be limited to such particular construction except where specifically included in the claims.

In that form of the invention shown in Figs. 1, 2 and 3, the disk-shaped celluloid sheet 10 is provided with a top ring 11 of celluloid and a bottom ring 12 of the same material preferably cemented thereto, and while both rings may be of the same external diameter as the diaphragm, one ring is of larger internal diameter than the other ring for the purpose of avoiding the formation of directly opposite clamping shoulders for the celluloid disk which would tend to have a shearing action thereon during the vibrations of the disk that might be liable to cause the disk to be cut through at the inner edges of said rings. This advantage would be equally true of rings of other material, and consequently I do not desire to be confined to the use of celluloid rings, except where specified in the claims, though such rings may be preferable because of their indestructible nature coupled with their resilient or cushioning properties which enable the diaphragm to vibrate with greater facility than if the edges of the disk were held between unyielding members.

It is not essential that the rings 11 and 12 be made separate from the disk portion, but they may be integral therewith, as shown in Fig. 4, where they are designated by the numerals 11' and 12' respectively to distinguish from the separate rings.

The stylus connection with the diaphragm may be made in any desirable manner, a convenient means being shown, wherein a flat headed anchor 13 is passed through a central opening of the disk with its head upon the disk and its stem projecting below the disk where it is provided with an opening to receive a link 14 connecting it with the stylus lever 15, such anchor 13 being held firmly in place on the disk by cement. A modified form of anchor connection is shown in Fig. 4 wherein a U-shaped staple 13' is employed with its ends bent outwardly

and engaging the upper surface of the disk and its looped portion passing through a central opening in the disk.

Another feature of novelty of the invention is a reinforcement 16 of the central portion of the disk, which is desirably of a cross or star shape with radially extending tapering arms gradually diminishing in thickness as well as in width as they approach the edge of the disk. These arms of the reinforcement terminate before reaching the edge of the disk, leaving a space between them and the inner edges of the rings 11 and 12 so that the greatest flexibility of the diaphragm will be at its peripheral portion, just inside of its supporting edge, and its central portion will gradually vary in flexibility, becoming less flexible as the center is approached. Such reinforcement may be produced by the flexible cement holding the anchor 13 in place which may be celluloid cement or the like, but is preferably of collodion, or what is known on the market as New Skin. A reinforcement of this character is yielding and resilient and serves to stiffen the central portion of the diaphragm, or render it less flexible, so that minor influences affect the diaphragm to a greater degree and are not localized at its center.

By the use of celluloid for a diaphragm, the desired flexibility is provided together with that resiliency which is necessary to enable the diaphragm to recover after responding to one set of influences so as to more promptly and accurately respond to a succeeding set of influences. The nature of celluloid is such that it does not produce the metallic or rasping sound incident to vibrations of metallic diaphragms and diaphragms of mica and glass and such materials. Celluloid may be readily produced of even gage throughout and without minute irregularities in its plane surface, as is usual with other materials, and which may account for foreign sounds in the reproduction, on the principle of the well known sharp sounding instrument which produces a loud snapping noise upon bending a tongue of spring metal which has an indentation embossed therein.

Neither is it true of celluloid that minute flakes or scales are present thereon, which, by independent vibrations may produce foreign sounds, as with mica and such materials. The diaphragm may be molded and the rings and the reinforcement may be integral therewith.

The gaskets of celluloid possess sufficient elasticity to enable the diaphragm disk being

clamped between them to the desired degree which will not interfere with its vibrations, but will prevent its chattering in its seat. Such rings of celluloid furthermore are not subject to deterioration as with rubber and other rings now in use. The arrangement of the rings, whereby their inner edges are not opposite, avoids the possibility of their cutting through the disk as might otherwise be the case in course of time.

The superior results obtained by the use of the diaphragm of this invention may be due to causes other than those specified, but the explanation given is that which I now believe to be correct.

What I claim as new and desire to secure by Letters Patent is:

1. A diaphragm for sound recording or reproducing instruments, comprising a flexible disk, and a resilient plastic reinforcement for the center thereof in the shape of a cross with its members tapering in width from the center toward their outer ends and diminishing in thickness from the center toward their outer ends.

2. A diaphragm for sound recording or reproducing instruments, comprising a flexible disk, a resilient plastic reinforcement at the center thereof comprising an application of cement in the shape of a star with its points tapering in width and diminishing in thickness toward their outer ends and terminating before reaching the edge of the disk.

3. A diaphragm for sound recording or reproducing instruments, comprising a flexible disk, a resilient plastic reinforcement at the center thereof comprising an application of cement of a star shape with its points tapering in width and diminishing in thickness toward their outer ends, and a headed anchor passing through the center of the disk and held in place by the cement reinforcement to form a stylus connection.

4. A diaphragm for sound recording or reproducing instruments, comprising a disk of sheet celluloid, and a resilient plastic reinforcement at the center thereof comprising an application of flexible cement, as collodion of a star shape, increasing in thickness toward the center thereof.

In testimony whereof I affix my signature, in presence of two witnesses.

JAMES H. ELLIS.

Witnesses:

R. S. C. CALDWELL,
KATHERINE HOLT.

MACHINE FOR TRANSMITTING SOUND
OVER LONG DISTANCES,

1,177,047-----W. Opel,

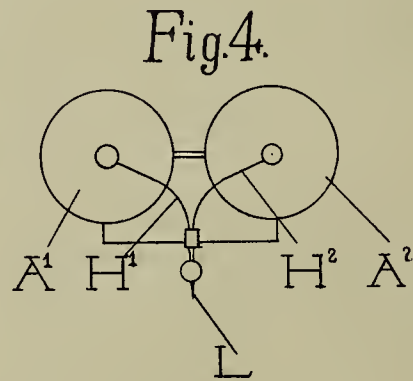
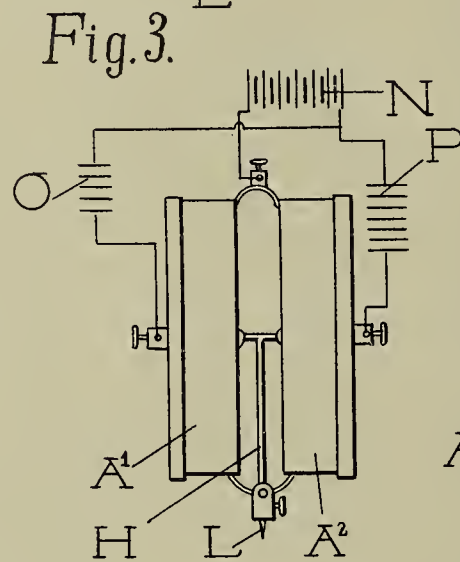
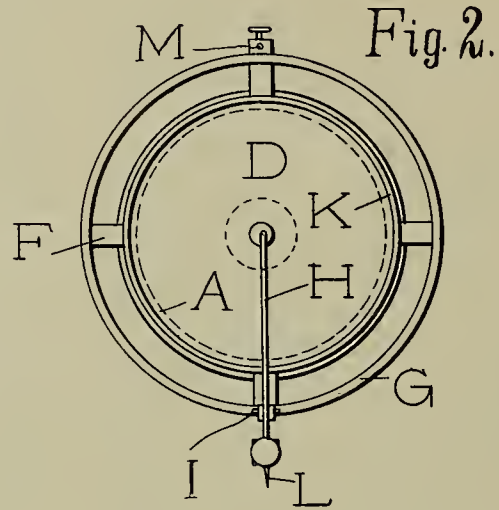
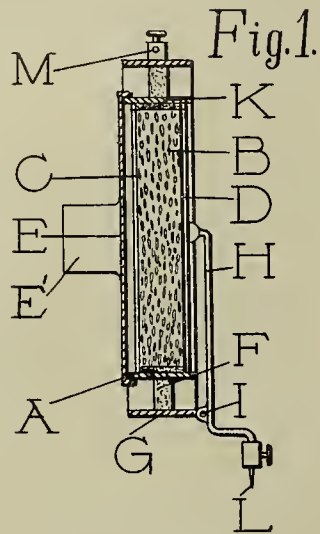
Patented-March 28th, 1916.

Filed-April 24th, 1913.

W. OPEL.
MACHINE FOR TRANSMITTING SOUND OVER LONG DISTANCES.
APPLICATION FILED APR. 24, 1913.

1,177,047.

Patented Mar. 28, 1916.



Witnesses
Edward Grosclaude
Emilie Guntz

Inventor
Walter Opel

UNITED STATES PATENT OFFICE.

WALTER OPEL, OF LEIPZIG, GERMANY.

MACHINE FOR TRANSMITTING SOUND OVER LONG DISTANCES.

1,177,047.

Specification of Letters Patent.

Patented Mar. 28, 1916.

Application filed April 24, 1913. Serial No. 763,425.

To all whom it may concern:

Be it known that I, WALTER OPEL, citizen of Germany, residing at Leipzig, State of Saxony, Germany, have invented certain new and useful Improvements in Machines for Transmitting Sound Over Long Distances, of which the following is a specification.

This invention has reference to improvements in talking machines by means of which the sound waves are transmitted over long distances. For the purpose of transmitting the sound waves of a talking machine over long distances, use is generally made of sound-boxes constructed each in the form of a microphone. However, it is not possible with such means to obtain a sufficiently audible tone transmission owing to the fact that the required strengths of currents necessary for this purpose produce disturbing heat effects in the sound-box and even in the stylus. These heat effects may rise to such a degree as to cause damage to the record or even destroy it.

It is the special purpose of the present invention to obviate the described drawbacks. This has been primarily attained for the distant transmission of sound by the provision of heat insulating means on the sound-box, as will be more clearly understood from a description of the accompanying drawings in which:

Figure 1 represents in elevation, partly in section, a sound-box of a talking machine embodying in desirable form the present improvements. Fig. 2 is a front view of the same. Figs. 3 and 4 illustrate two different constructions of a double sound-box of this kind.

Similar characters of reference denote like parts in all the figures.

The microphone cell of the sound-box shown consists of a casing A containing a filler or charge B of carbon particles or the like which are located between the two plates C and D. Adjoining the plate C there is a cover plate E which carries a socket that is secured to the carrier arm of the talking machine.

According to the present invention the casing A of the sound-box is provided with a number of heat insulating members F, of which four are shown in Fig. 2. These members may be connected by a common ring G which at the same time serves as a protective jacket enabling the operator to

grasp the sound-box should it be heated by the current traversing it. This is rendered possible because the transmission of heat to the ring G is prevented by the insulating members F. The ring G may be perforated or otherwise so constructed as to increase the air cooling action. These heat insulating members are advantageous for the operator in handling the sound-box and indirectly aid in supporting the terminal M. The arm H may be supported on the ring G, which holds the heat insulating members F in position. In this instance, the arm or stylus support H is preferably arranged so as to oscillate about its supporting pivot I. The transmission of heat through the pivot of the arm H is prevented because it is mounted on the ring G which in turn is connected to the heat insulating members F. The transmission of heat through the arm H is not great under any circumstances because this arm consists of a thin metal body which radiates heat rather quickly.

In order to minimize the transmission of heat in accordance with the present invention the covering plates C, D of the sound-box are not made of metal sheeting but consist of carbon disks and to secure them at a certain distance a ring K of asbestos is interposed, as shown in Figs. 1 and 2. By virtue of these carbon disks the transmission of heat is considerably reduced, on the one hand, to the arm H and on the other hand to the metal plate E on which the socket or short tube E¹ is arranged.

If the stylus supporting arm H is constructed as a bell crank lever, as shown, the stylus L may be used both for the vertically undulating as well as for the laterally undulating type of record because it is capable of oscillating in two directions, one perpendicular to the other and transmitting its vibration through the arm H to the carbon plate D. It is evident that the arm H may be supported directly on an insulating member F instead of being supported on the ring G which holds the insulating members F in position.

In order to counteract overcharging and consequently the weakening of the tone strength and to render it possible to employ a relatively large number of reproducing apparatuses, a multiple of sound-boxes, as hereinbefore described, may be arranged in series and made operative by means of a stylus common to all. In this case a special

circuit preferably is provided for each sound-box so as to act on a separate group of tone reproducing devices, or the sound-boxes may be arranged in multiple arc in one circuit, if desired. According to the arrangement, diagrammatically shown in Fig. 3, two sound-boxes with casings A^1 , A^2 are arranged parallel to one another and the stylus L, through the intermediary of the arm H, is adapted to act simultaneously on the carbon plates of both boxes. The branching of the circuit is made, at the source of electricity N, in two directions, one extending to the group of apparatuses O through the sound-box A^1 and the other to a similar group of apparatuses P through the sound-box A^2 .

In the arrangement diagrammatically shown in Fig. 4, the sound-boxes A^1 , A^2 are arranged side by side and the stylus L acts on the carbon plates through the intermediary of forked arms H^1 H^2 .

I claim as my invention:

1. A device for long distance transmission of sound comprising a sound-box with a microphone cell, heat insulating means thereon, a stylus supporting bar on the sound-box, a pivot on which the bar oscillates, said bar and pivot being insulated against heat from the microphone cell by the heat insulating means, and a stylus in the oscillating bar.

2. A device for long distance transmission of sound comprising a sound-box with a microphone cell, heat insulating means on the sound-box, means for holding said heat insulators in position, an electric terminal on the heat insulator holding means, a stylus supporting bar on the sound-box, a pivot on which the bar oscillates, said bar and pivot being insulated against heat from the microphone cell by the heat insulating means, and a stylus in the oscillating bar.

3. A device for long distance transmission of sound comprising a sound-box with a microphone cell, heat insulating means on the sound-box, a ring or jacket holding the heat

insulating means in position, a stylus supporting bar on the sound-box, a pivot on which said bar oscillates, said bar and pivot being insulated against heat from the microphone cell by the heat insulating means, and a stylus in the oscillating bar.

4. A device for long distance transmission of sound comprising a sound-box with a microphone cell, a multiple of separate heat insulating means on the sound-box, a ring or jacket holding the heat insulating means in position, a stylus supporting bar on the sound-box, a pivot on which said bar oscillates, said bar and pivot being insulated against heat from the microphone cell by the heat insulating means, and a stylus in the oscillating bar.

5. A device for long distance transmission of sound comprising a sound-box with a microphone cell composed of an asbestos ring, carbon plate covers, and a casing, a multiple of heat insulating members on the sound-box separated from the asbestos ring by the casing, a stylus supporting bar on the sound-box, a pivot on which said bar oscillates, said bar and pivot being insulated against heat from the microphone cell by the heat insulating members, and a stylus in the oscillating bar.

6. A device for long distance transmission of sound comprising a sound-box with a microphone cell, a multiple of heat insulating members on the sound-box, a ring or jacket for holding said heat insulating members in position, a stylus supporting bar on the sound-box, a pivot supported on said ring on which the bar oscillates, said bar and pivot being insulated against heat from the microphone cell by the heat insulating means, and a stylus in the oscillating bar.

In testimony whereof I have affixed my signature in presence of two witnesses.

WALTER OPEL.

Witnesses:

RUDOLPH FRICKE,
TRAUGATT OPEL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

STOP MECHANISM FOR PHONOGRAPHS,
#1,177,227-----F. S. Boerries,
Patented-March 28th, 1916.
Filed-July 12th, 1913.

1,177,227.

2 SHEETS—SHEET 1.

FIG-1 -

Witnesses:
M. Roche
Bink Newcomb.

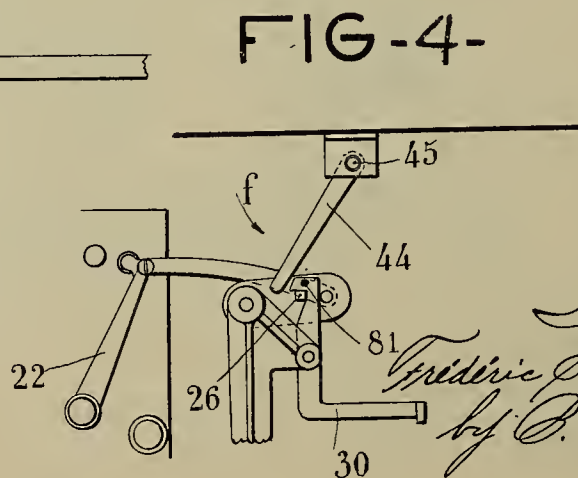
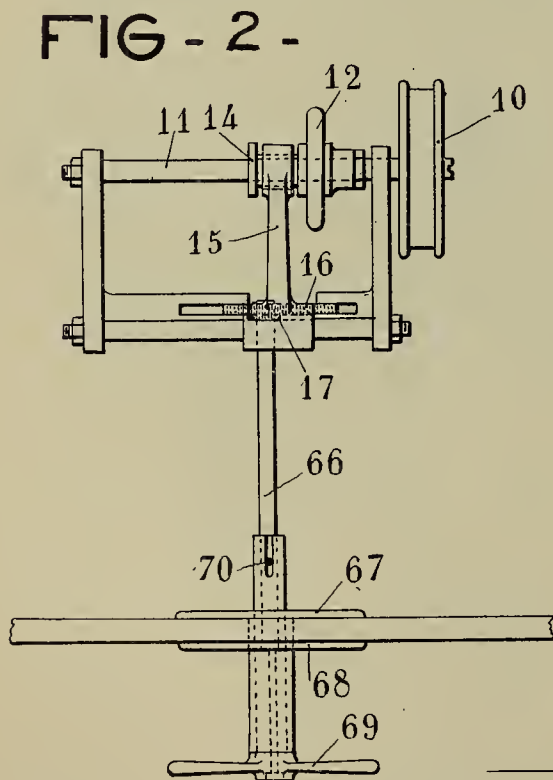
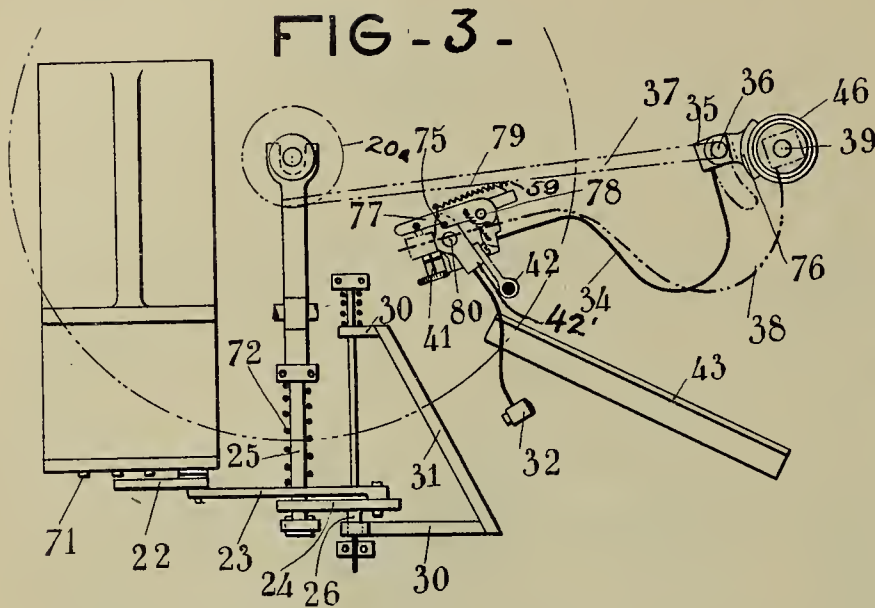
Inventor:
Frederic S. Coe
by B. Singer

F. S. BOERRIES.
STOP MECHANISM FOR PHONOGRAPHS.
APPLICATION FILED JULY 12, 1913.

1,177,227.

Patented Mar. 28, 1916.

2 SHEETS—SHEET 2.



Witnesses:
M. Roche
Ben. Newcomb.

Inventor:
Frederic S. Boeries
by C. Singer
Atty

UNITED STATES PATENT OFFICE.

FRÉDÉRIC STÉPHEN BOERRIES, OF PARIS, FRANCE.

STOP MECHANISM FOR PHONOGRAPHS.

1,177,227.

Specification of Letters Patent.

Patented Mar. 28, 1916.

Application filed July 12, 1913. Serial No. 778,763.

To all whom it may concern:

Be it known that I, FRÉDÉRIC STÉPHEN BOERRIES, a citizen of the French Republic, residing at 45 Rue Guersant, Paris, France, have invented new and useful Improvements in Stop Mechanism for Phonographs, of which the following is a specification.

This invention relates to phonographs including its complemental reproducer, start and stop mechanism, casing and motor mechanism said parts being constructed to eliminate all vibrations and the objectionable features caused thereby.

The objects of my invention reside in a resiliently supported motor suspended in air, means for regulating the speed of the disk; and instantaneous or regulated stopping of the disk.

With these and other objects in view the invention consists of the improvements hereinafter described and finally claimed.

The nature, characteristic features and scope of the invention will be more fully understood from the following description taken in connection with the accompanying drawings, in which like reference characters designate similar parts throughout the several views of the invention, and in which:

Figure 1 is a longitudinal view of my invention. Fig. 2 is a plan view of the speed regulator. Fig. 3 is a plan view of the automatic stop mechanism. Fig. 4 is a longitudinal view of the instantaneous stop mechanism.

Referring to the drawings and particularly to Fig. 1, I have there shown a preferred embodiment of my invention in which 1 designates an electric motor suspended in mid-air through medium of straps 2 fastened at 7 to cross bars 3, which have their ends secured to supports 4 and 5. Resilient washers 6, 6, are provided for supports 4 and 5 and are adapted to support the rod 3. The aforesaid construction provides an elastic support for the motor, and eliminates all vibrations due to the operation of the same. A belt wheel 9 is secured to the shaft of the motor 1 and connected to the belt wheel 10 by means of a belt 8. The belt wheel 10 is non-rotatably mounted on a shaft 11, which has non-rotatably but slidably mounted thereon a friction driving wheel 12. Sleeves 14 non-rotatably and slidably mounted on said shaft 11 and integral with said wheel 12 are provided with a con-

necting rod 15 rotatably mounted on sleeves 14, and having its other end provided with a ratchet 16 operatively engaged by a pinion 17. A lever 69 provided with a sleeve is adapted to engage a shaft 66 formed integral with pinion 17 and serves to slide the friction wheel 12 in one of two directions, thereby increasing or decreasing the speed of a friction disk 13, mounted on a hollow shaft 18 which is adapted to receive the shaft of disk 19. The shaft 18 has secured thereto a cam 27 which lowers the shaft 18 and its complemental disk 13 adjacent the friction wheel 12 when the motor is operated, as will hereafter more fully appear. The disk record 20 adapted to receive the stylus secured to a reproducer 51 is carried by the disk 19. A rheostat 21 provided with a contact lever 22 and suitable contact points 71, is connected to the motor 1. A lever 23 is pivotally secured to the contact lever 22 and has its other end pivoted to a plate 24 which in turn is pivotally secured to the shaft 25, provided with a spring 72 to normally force the plate 24 in a vertical position. A lever 29 having one end secured to the shaft 25 has a bell crank 30 pivotally secured to its other end. A plate 31 is formed integral with the end of the bell crank 30 and having its other end adapted to releasably engage an abutment 26 formed on the plate 24.

The horn of the phonograph is rotatably mounted in the bearing 48 and has its lower portion 49 rotatably mounted therein, independent of the direction of rotation of the horn. A vertical support 46 is provided and contains a rotatable connection 39, having one end secured to the portion 49 and the other end has non-rotatably mounted thereon a collar α . Bearing brackets 76 are formed in the support 46 and serve to rotatably retain a member 36 having provided at one end thereof a baffle 37 and an integral collar 35, secured to the other end thereof.

A movable stop mechanism is secured to the other end of elastic hands 34 and 38 which have one end secured to collars 35 and α respectively. The operation of the locking member will hereafter be more fully described in the operation of the phonograph.

A shaft 45 is journaled in the casing of the motor mechanism and is provided with an actuator 44, normally adjacent the other

end of the bell crank 30 and abutment 26 and serves to manually release the abutment 26, plate 24 and stop the motor at will.

The reproducer is of the usual type having the needle or stylus and its complementary holder resiliently mounted in the diaphragm frame.

The operation of the device is as follows: The lever 22 is formed to the position shown in Fig. 1 which serves to turn on the current and rotate the motor and its complementary friction wheel 12, the lever 23 is simultaneously forced to the right, depressing the plate 24 and serving to force the abutment 26 into engagement with the crank 30. The cam 27 being secured to the shaft 25 is given a part of a turn and serves to lower the shaft 18 and its complementary disk 13 into frictional engagement with the friction wheel 12. The plate disk 19 and its complementary shaft are also rotated. Should it be desired to stop the rotation of the plate 19, before the disk has been completely played, the shaft 45 is rotated anti-clockwise, which causes its actuator 44 to press against the crank 30, and release the abutment 26. The spring 72 then serves to raise the plate 24 and return the connection 23 and lever 22 to its initial position, and the cam 27 will be returned to its original position, thereby raising the disk 13 out of engagement with the friction wheel 12.

In order that the disk and motor may be automatically stopped when the disk has been played, I provide the baffle 37 which is placed with its end adjacent the inner end of the playing surface of the disk. The band 34 which is rotating simultaneously with said baffle carries on its other end an automatic stop mechanism which actuates the plate 31, and releases the abutment 26 and its complementary parts as has heretofore been described. The metal band 38 has one end secured to the automatic release and its other end secured to the collar x which is rotatable with the arm 49 and its complementary stylus. An obstruction 43 is conveniently attached so as to automatically cock the automatic release after the same has been operated. A depending stud 42 secured to the plate 42' is adapted to slide behind a fixed bar 43 attached to the box of the gramophone and to cock the hammer 32 after it has been released. The automatic stoppage of the gramophone when the record reaches the end of its course is obtained in the following manner: First, the rod 37 is moved over the record until its end is positioned adjacent to the neutral circle 20^a of said record, as shown in Fig. 3. This movement of the rod 37 causes the parts carried thereby to take up the positions shown in said figure, owing to the fact that the rod 37 and the band 34 are secured on a common

axle 36. The hammer 32 is held cocked by means of a pin 75 on the plate 42' engaging against the action of a coil spring 79, a shoulder of the plate 77. One end of said spring is secured to the fixed pivot 59 and its other end bears upon the plate 77, pivoted at 78, to which is secured the band 34 and which is controlled by a spring. The gramophone is now started by moving the arm 22 into the position shown in Fig. 1, thus causing the lever 30 to engage over the stud 26. The rod 38 keyed to the spindle 39 is thus connected to the trumpet arm 26 and carries at its end the adjustable screw 41. It follows the movement imparted to said trumpet arm by the record. At the moment when the needle or stylus reaches the end of its course, the screw 41 abuts against the plate 77 causing it to turn on its pivot 78 and the hammer 32 under the action of the spring 79 pivots around the axle 80 and strikes against the plate 31. Thus, the lever 30 connected with the plate 31 releases the stud 26, the arms 22, 23 and 24 return into their initial position under the action of the spring 72 which is wound around the axle 25, and the lever 22 is brought back to the neutral contact 71 of the rheostat for stopping the motor.

I have herein described a preferred embodiment of my invention as is best known to me at the present time for practising the same, but I do not limit myself to the exact description or design shown, as I reserve the right to make minor changes in both without departing from the spirit of my invention and the scope of the appended claims.

I claim:

1. A phonograph comprising its complementary motor mechanism comprising in combination, a frame, a motor resiliently suspended from said frame, a rheostat secured to said frame connected with said motor, a driven member rotated by said motor, a disk adapted to be rotated by said member, normally out of engagement with said member, and means for automatically bringing said disk into engagement with said member, a manual and automatic cut-off whereby said current is cut-off and said disk automatically brought out of engagement with said member, substantially as described.

2. A phonograph comprising its complementary motor mechanism comprising in combination, a frame, a motor resiliently supported below said frame, a disk revolvably mounted on said frame and adapted to be displaced in a vertical direction, a power transmission intermediate said disk and motor, a rheostat provided with an arm adapted to simultaneously operate said motor and lower said disk, means adapted to retain said disk in operative position, a

baffler adapted to be positioned over said disk, and means coacting between said baffler and said disk retaining means to automatically raise said disk and shut off
5 said motor.

3. A motor mechanism for phonographs comprising a frame, a motor resiliently suspended from said frame, a friction driven wheel normally out of operative po-
10 sition, a slidably mounted friction driving wheel adapted to be connected to said motor, a rheostat secured to said frame provided with a lever, a plate pivotally mounted on a
15 shaft said plate mounted in said frame normally retained in a vertical position and adapted to be secured to the other end of

said lever, a cam secured to said plate and driven disk, an abutment secured to said plate, a lever having one end mounted in said shaft and its other end pivotally re- 20 taining a bell crank, and means engaging said bell crank for automatically or instantaneously stopping said motor and disk, substantially as described.

In testimony whereof I have signed my 25 name to this specification in the presence of two subscribing witnesses.

FRÉDÉRIC STÉPHEN BOERRIES.

Witnesses:

HANSON C. COXE,
MIGUEL FEROLLO.

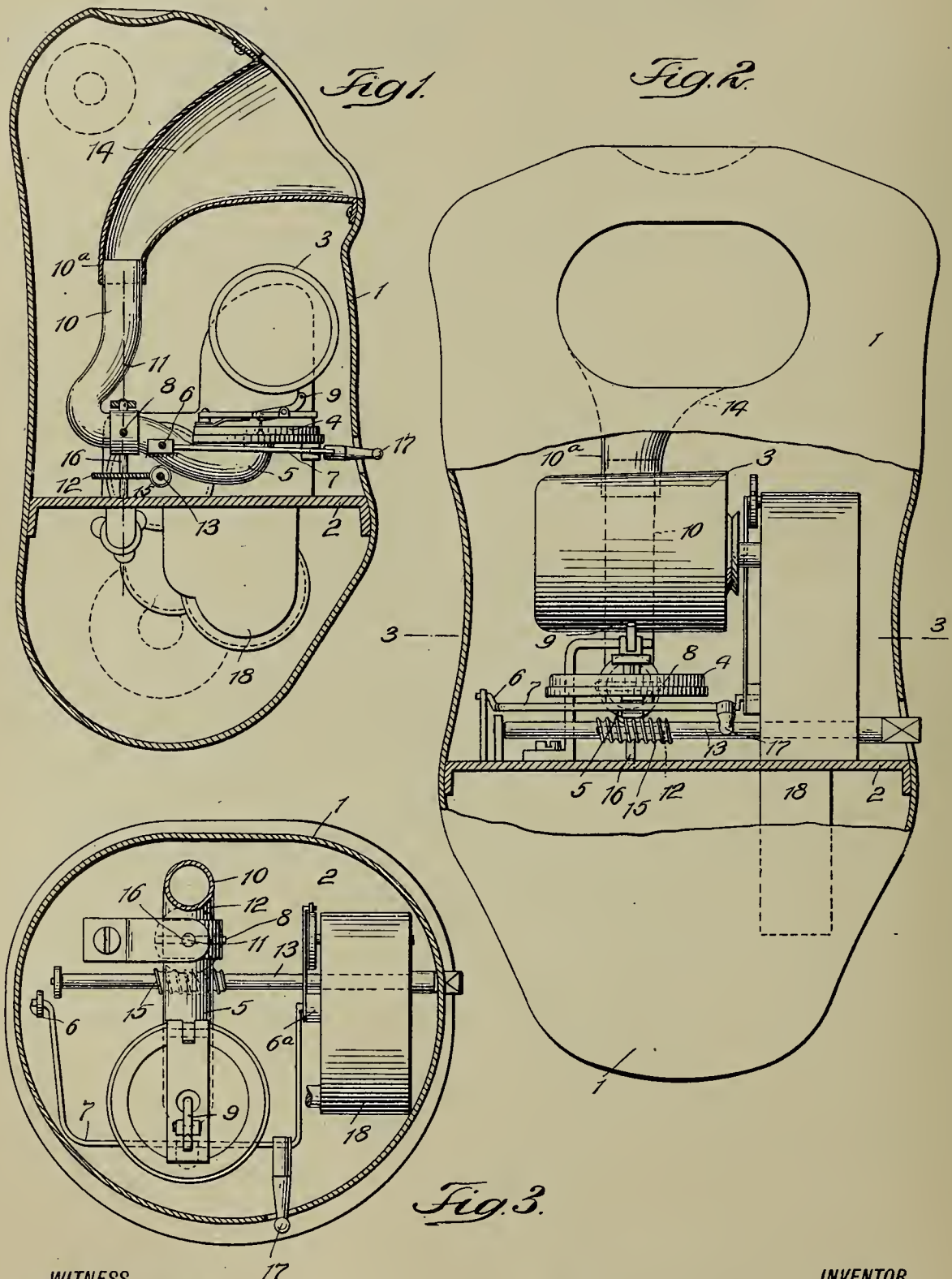
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

ARRANGEMENT OF THE PARTS OF A TALKING
MACHINE IN PARTICULAR FOR SPEAKING DOLLS,
#1,177,887-----A. M. Newman,
Patented-April 4th, 1916.
Filed-February 16th, 1915.

A. M. NEWMAN.
 ARRANGEMENT OF THE PARTS OF A TALKING MACHINE IN PARTICULAR FOR SPEAKING DOLLS.
 APPLICATION FILED FEB. 16, 1915.

1,177,887.

Patented Apr. 4, 1916.



WITNESS
Julius H. [Signature]

INVENTOR
 Alexander M. Newman
 BY
Briesen & Gumpel
 ATTORNEYS.

UNITED STATES PATENT OFFICE.

ALEXANDER M. NEWMAN, OF BERLIN-WANNSEE, GERMANY.

ARRANGEMENT OF THE PARTS OF A TALKING-MACHINE IN PARTICULAR FOR
SPEAKING DOLLS.

1,177,887.

Specification of Letters Patent.

Patented Apr. 4, 1916.

Application filed February 16, 1915. Serial No. 8,659.

To all whom it may concern:

Be it known that I, ALEXANDER M. NEWMAN, a citizen of the United States of America, and residing at Berlin-Wannsee, Germany, have invented certain new and useful Improvements in Arrangement of the Parts of a Talking-Machine in Particular for Speaking Dolls, of which the following is a specification.

10 In assembling the several parts of a talking machine, intended for use in the body of a doll or a show-figure, entirely different principles have to be observed than with ordinary talking machines. This fact has
15 heretofore not been sufficiently considered in the construction of speaking dolls, and the ordinary talking machines were too closely copied. In consequence thereof such dolls have the disadvantage, that they will talk
20 only when they are placed into a given position, generally a sitting position, whereas they will refuse to talk if laid down flat, carried about or stood on their heads.

The present invention relates to a novel arrangement of the parts of a talking machine for the aforementioned purpose, and consists essentially in that the sound box is disposed beneath the roll or the otherwise shaped record bearer, such as a disk or the like,
30 and is connected with the upwardly extending horn by means of a rigid tube. When, therefore, the talking machine is intended for a speaking doll, the sound box is situated, with reference to the upright body of the
35 doll, below the roll, and the horn, connected to it by means of a rigid tube, projects into the upper part of the body. With this arrangement the pin of the sound box engages in the record by the said sound box
40 being supported by a yielding carrier, so that even if the position of the doll is changed, while the motor of the talking machine is running, the record pin will not jump the record, and the rendering of the record is by
45 all means insured.

The rigid connection between the horn and the sound box is a specially advantageous feature of the sound passage, as it is well known, that elastic connections have not
50 proved satisfactory, and a loose connection, which allows of a relative displacement between sound box and horn is very unsuitable, as it offers false passages to the sound. A further improvement consists in the horn
55 being disposed with its mouth rigidly se-

cured behind an opening in the chest of the doll. It is already known to let the sound of the talking machine emerge from an opening in the chest, as this will give the sound a more natural effect, but the horn
60 had heretofore been arranged loose in front of such opening and displaceable together with the sound box, so that again leakage may take place.

Hitherto there existed no suitable connection between the rigid horn and the sound tube connecting with the movable sound box, if the elastic connection, which entailed many disadvantages was not employed. According to the present invention the arrangement is such, that the sound tube with the sound box rigidly attached to it is revolvably disposed on a shaft passing through the neck of the horn. According to the space
70 available within the doll's body, the arrangement of the horn may be also different from that described above without the effect being changed, so a sound tube section of any shape may be interposed between the revolvable sound tube and the horn, for the purpose
80 of producing a louder voice. It is, however, an essential feature of the present invention, that the axis of rotation of the movable sound tube passes through the center of the rigid neck of the horn. By such an arrangement it is made possible to manufacture the whole sound passage of rigid material. The rocking movement of the sound tube for
85 allowing the sound box rigidly attached to it to travel along the entire record roll is obtained by means of a worm wheel, which is fitted to said sound tube in such a manner, that the aforementioned axis of rotation passes through its center. With this worm
90 wheel a worm of the motor engages and produces the desired motion. Preferably the arrangement is such that this gear is driven by a worm of the winding spindle, which by its being revolved in a reverse sense during the winding of the motor will re-
100 turn the sound box from its terminal position into its initial or starting position.

In the accompanying drawing: Figure 1 is a vertical section through the body of a doll provided with the talking mechanism
105 embodying my invention; Fig. 2 a front view partly in section thereof, and Fig. 3 a cross section on line 3—3, Fig. 2.

Within the body of the doll, marked 1, a base plate 2 is suitably secured, to the un-
110

derside of which is fitted the motor 18, while on its upper side the talking machine is arranged. This talking machine consists of the roll 3 and the sound box 4 with the record pin 9, and the tone arm 5. The sound box 4 carrying the tone arm 5 is supported upon a resilient carrier or yoke 7, which is secured to lugs 6 and has by its resiliency, a tendency to press the sound box slightly upward so that the pin 9 will be brought into engagement with the record. The yoke is furnished with a handle 17 which extends outwardly through an opening in the body of the doll so as to be readily accessible. Yoke 7 engages a suitable motor (which does not form part of the present invention, and which may be located in a housing 6^a) in such a manner that when the yoke is raised, the motor is set off, while when the yoke is lowered, the motor is arrested. The tone arm 5 is hinged at 8, in order to allow of taking up the radial oscillations of the roll. Back of this hinge follows a rigid elbow extending upward, to which the sound tube 10 is attached. The horizontal portion of the sound passage described is supported by a spindle 16 being disposed in the direction of the axis 11 of the upright portion 10 of said tube and extending at right angles to hinge 8. Upon spindle 16 is fitted a wheel 12, which engages with a worm 15 on the winding spindle, shown at 13. The upper end of the sound tube 10 engages in the neck 10^a of the horn 14, the mouth of which is turned toward an opening in the chest of the body and is suitably secured in such position.

The operation of the arrangement described is as follows: When the winding spindle 13 is turned for winding the motor in the usual manner, the worm 15 and wheel 12 will turn the spindle 16, so that the sound box is returned to its starting position. By raising the lever 17 the motor is released as above described and the sound box 4 is pressed by its resilient yoke 7 with its pin 9 against the record roll. In order to permit the pin 9 to follow the records on the roll, the spindle 13 now turns by means of the worm gear 15—12 the tone arm 5 about the spindle 16, and therewith also about the axis 11 of the tube 10, so that the tube will remain in permanent engagement with the neck 10^a of the horn 14. The vertically reciprocating oscillations of the roll are taken up by the hinge 8. The sound waves from the sound box 4 pass through a rigid sound passage only, which is composed of the sections 5, 10, 14 and emerge from the chest of the body.

A glance at the drawing will show that this arrangement of the parts allows of a very practical utilization of the space available, without a short sound passage, which would unfavorably affect the voice, having

to be employed. On the contrary, this sound passage is, by the fact of its being carried around the roll, of a sufficient length to render the record in a satisfactory manner.

I claim:

1. In a talking machine for speaking dolls the combination of a record bearer a sound box disposed below the record bearer, with reference to the upright body of the doll, a resilient carrier supporting said sound box and adapted to hold the said sound box pressing with its pin at a suitable pressure against the record, while the talking machine is running.

2. In a talking machine for speaking dolls, the combination of a record bearer a sound box disposed below the record bearer, with reference to the upright body of the doll, a resilient carrier supporting said sound box and adapted to hold the said sound box pressing with its pin at a suitable pressure against the record, while the talking machine is running, a horn projecting into the upper part of the body of the doll, and a tube rigid with the sound box connecting the latter with the horn.

3. In a talking machine for speaking dolls, the combination of a record bearer a sound box disposed below the record bearer, with reference to the upright body of the doll, a resilient carrier supporting said sound box and adapted to hold the said sound box pressing with its pin at a suitable pressure against the record, while the talking machine is running, a horn projecting into the upper part of the body of the doll and rigidly secured behind an opening in the chest of the latter and a tube rigid with the sound box connecting said sound box with the horn.

4. In a talking machine for speaking dolls, the combination of a record bearer a sound box disposed below the record bearer, with reference to the upright body of the doll, a resilient carrier supporting said sound box and adapted to hold the said sound box pressing with its pin at a suitable pressure against the record, while the talking machine is running, a horn projecting into the upper part of the body of the doll and rigidly secured behind an opening in the chest of the latter and a tube rigid with the sound box connecting said sound box with the horn, the said tube and sound box being pivotable around an axis extending through the neck of the horn.

5. In a talking machine for speaking dolls, the combination of a record bearer a sound box disposed below the record bearer, with reference to the upright body of the doll, a resilient carrier supporting said sound box and adapted to hold the said sound box pressing with its pin at a suitable pressure against the record, while the

5 talking machine is running, a horn project-
 ing into the upper part of the body of the
 doll and rigidly secured behind an opening
 in the chest of the latter and a tube rigid
 10 with the sound box connecting said sound
 box with the horn, the said tube and sound
 box being pivotable around an axis extend-
 ing through the neck of the horn, a motor a
 worm on said motor, a worm wheel in en-
 15 gagement with said worm and adapted to
 turn the said tube and sound box and trav-
 erse the sound box along the length of the
 record roll.

6. In a talking machine for speaking
 15 dolls, the combination of a record bearer a
 sound box disposed below the record bearer,
 with reference to the upright body of the
 doll, a resilient carrier supporting said
 sound box and adapted to hold the said
 20 sound box pressing with its pin at a suitable
 pressure against the record, while the talk-

ing machine is running, a horn projecting
 into the upper part of the body of the doll
 and rigidly secured behind an opening in
 the chest of the latter and a tube rigid with 23
 the sound box connecting said sound box
 with the horn, the said tube and sound box
 being pivotable around an axis extending
 through the neck of the horn, a motor a
 worm on said motor, a worm wheel in en- 30
 gagement with said worm and adapted to
 turn the said tube and sound box and trav-
 erse the sound box along the length of the
 record roll, the said worm being fitted to the
 winding spindle of the motor. 35

In testimony whereof I affix my signature
 in presence of two witnesses.

ALEXANDER M. NEWMAN.

Witnesses:

HENRY HASPER,
 WOLDEMAR HAUPT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
 Washington, D. C."

VOCAL AUTOMOBILE SIGNAL,
#1,177,978-----A.W.Washburn & C.D.Keeler,
Patented-April 4th; 1916.
Filed-March 7th, 1911.

A. W. WASHBURN & C. D. KEELER.
VOCAL AUTOMOBILE SIGNAL.
APPLICATION FILED MAR. 7, 1911.

1,177,978.

Patented Apr. 4, 1916.
2 SHEETS—SHEET 1.

Fig. 1

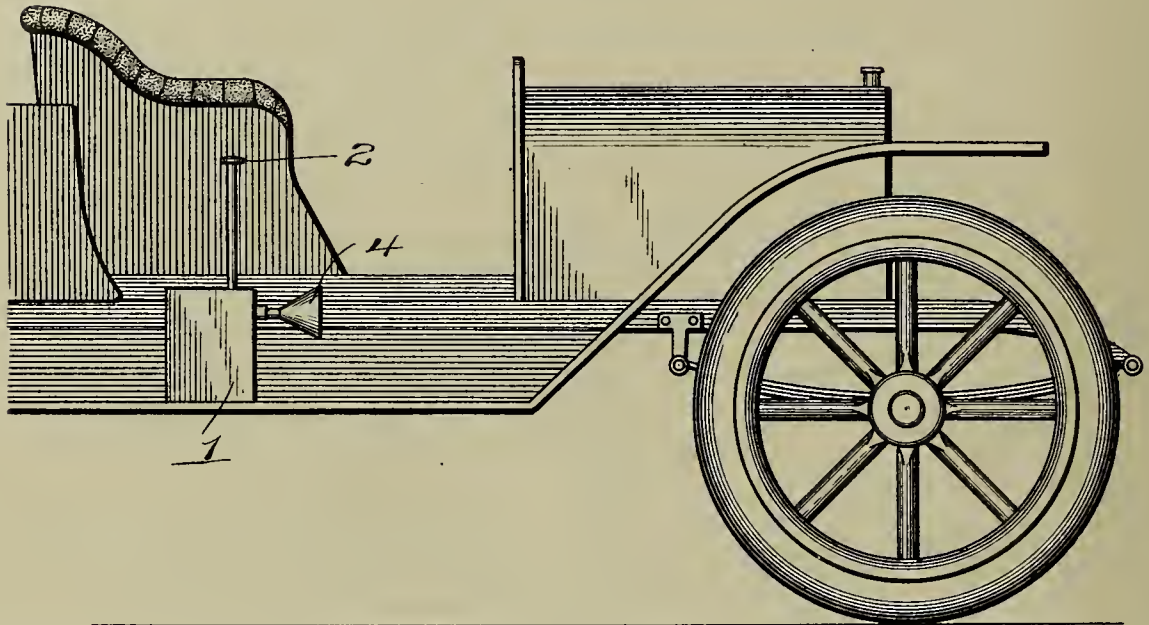


Fig. 4

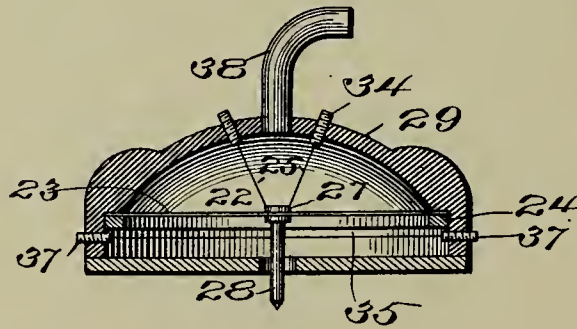


Fig. 5

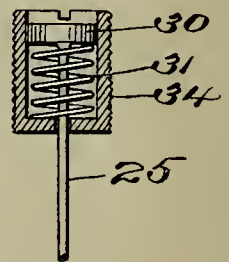


Fig. 6



Witnesses

J. M. Fowler Jr.
Charles N. Murray.

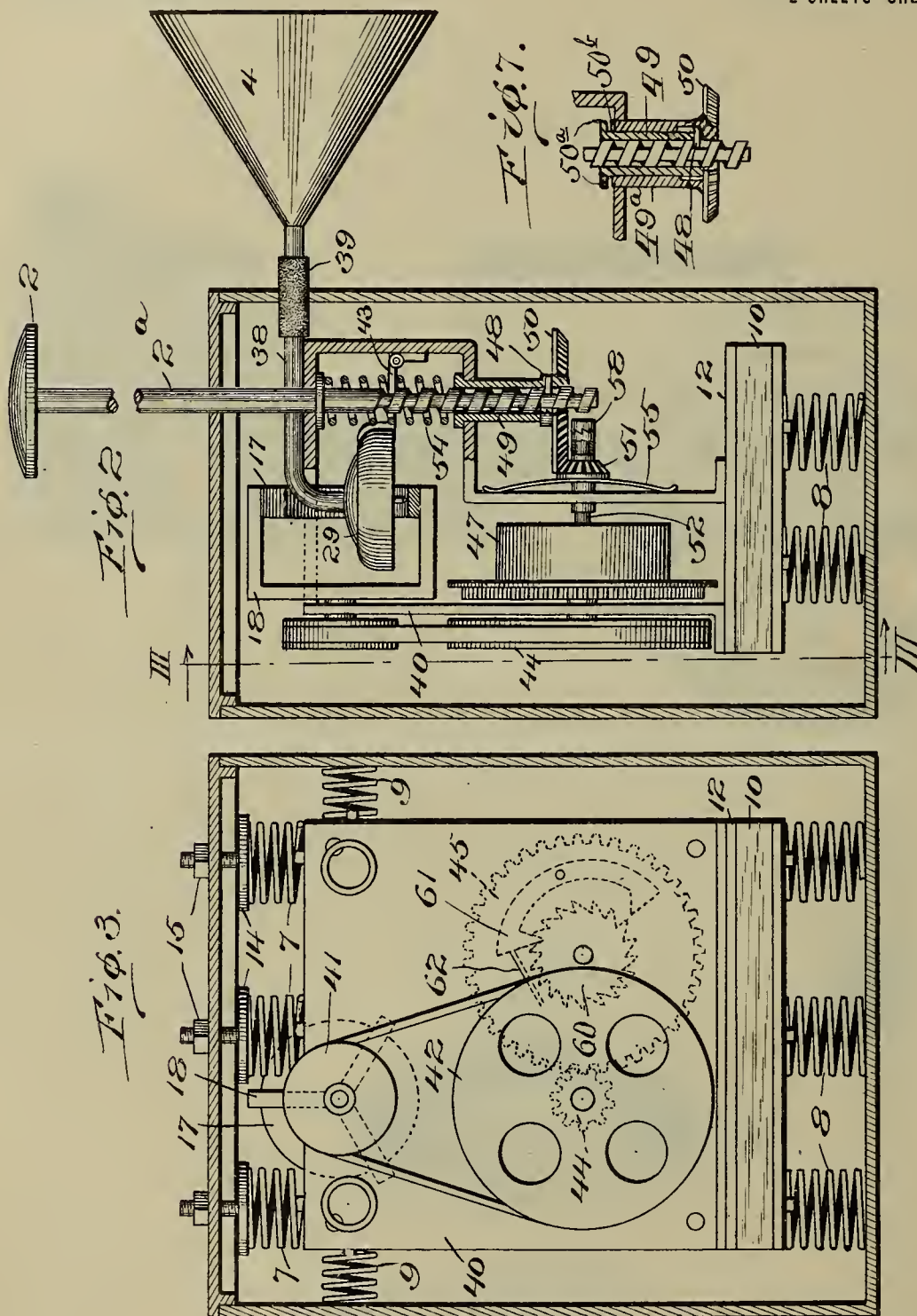
By

Inventors
Arthur W. Washburn
Charles D. Keeler
Eugene C. Brown
Attorney

A. W. WASHBURN & C. D. KEELER.
 VOCAL AUTOMOBILE SIGNAL.
 APPLICATION FILED MAR. 7, 1911.

1,177,978.

Patented Apr. 4, 1916.
 2 SHEETS—SHEET 2.



Witnesses

J. M. Fowler Jr.
Charles N. Murray.

By

Inventors
Arthur W. Washburn
Charles D. Keeler
Eugene C. Brown
 Attorney

UNITED STATES PATENT OFFICE.

ARTHUR W. WASHBURN, OF MEMPHIS, TENNESSEE, AND CHARLES D. KEELER, OF PERTHSHIRE, MISSISSIPPI; SAID WASHBURN ASSIGNOR TO SAID KEELER.

VOCAL AUTOMOBILE-SIGNAL.

1,177,978.

Specification of Letters Patent.

Patented Apr. 4, 1916.

Application filed March 7, 1911. Serial No. 612,745.

To all whom it may concern:

Be it known that we, ARTHUR W. WASHBURN and CHARLES D. KEELER, citizens of the United States, residing, respectively, at
5 Memphis, in the county of Shelby and State of Tennessee, and at Perthshire, in the county of Bolivar and State of Mississippi, have invented new and useful Improvements in Vocal Automobile-Signals, of which the
10 following is a specification.

Our invention relates to apparatus for producing audible signals and especially designed to be mounted upon automobiles.

Various devices are in common use such
15 as horns, gongs and whistles for the purpose of giving a warning note or signal to announce the approach of a vehicle. Some of these are musical and others are decidedly discordant, while many are shrill or start-
20 ling and cause much annoyance to all but the occupants of the vehicle. These sounds are meaningless and serve merely as warning noises.

Our invention provides a signal which
25 may not only be of any desired character, from a musical standpoint, but conveys an inherent meaning in the vocal warning of danger transmitted or spoken, thus performing a function which cannot be embodied in
30 a mere audible signal.

Our invention will be clearly understood from the following description in connection with the accompanying drawings in which—

35 Figure 1, is a side elevation of the forward portion of an automobile showing our audible signal apparatus mounted upon the running board; Fig. 2, is a side elevation of the apparatus with the side of the containing case removed; Fig. 3, is a vertical
40 section on the line III—III of Fig. 2; Fig. 4, is a vertical section of the phonographic reproducer; Figs. 5 and 6, are enlarged detail sectional views of the tensioning screws
45 of the reproducer; and Fig. 7, is a sectional view of a modified form of a portion of the winding mechanism.

The casing of the signal apparatus may be mounted upon the running board of an
50 automobile where the handle 2 will be within convenient reach of the hand or foot of the chauffeur or other occupant. The warning signal issues from the horn or trumpet
4, which is connected with the reproducer.

It is essential that the phonographic ap- 55
paratus should be shielded from the jars and vibrations of the automobile body and we, therefore, provide means for abolishing all shocks by mounting the apparatus with-
in the casing between cushioning devices. 60
Springs 7 and 8, absorb the vibrations in a vertical direction while springs 9 prevent lateral vibrations. To further insure an absence of vibration in the reproducer, we may
insert a pneumatic cushion 10, between the 65
base or platform 12, and the lower springs. To provide for the accurate adjustment of the tension of the cushioning devices, the upper springs bear against plates 14, which
may be raised or lowered by means of 70
nuts 15.

The actuating record is preferably carried upon the inside of a record cylinder 17, mounted in a rotary spider 18, which may
be rotated by any suitable motor device. In- 75
asmuch as the same signal is constantly repeated, the needle 20 of the reproducer follows the same actuating indentations of the record and there is no relative longitudinal
movement between the record cylinder and 80
the needle, so that the necessity for the usual feed mechanism is obviated. By causing the needle to traverse a concave record upon the inner surface of a cylinder instead of a con-
vex outer surface, it will be apparent that 85
the needle will come more perfectly into contact with the indentations and will be caused to vibrate with greater force which will
produce a greater volume and more distinct-
ness of sound. It is obvious, however, that 90
we may employ a cylinder carrying the record upon the outer surface.

The reproducer is illustrated in detail in Fig. 4. The upper wall of the reproducer or diaphragm chamber 22, is semi-elliptical 95
which is better adapted than a semi-circular form to the production and propagation of the acoustical or sound waves. The diaphragm 23, is held by the clamping ring 24. For the purpose of adjusting the tension 100
upon the diaphragm to tune it to the voice making the record and to vary the amplitude of vibration to produce the maximum effect of sound and clearness, tension wires
25 are attached to the central cap 27, by 105
which the needle 28 is secured to the diaphragm. If the tension wires were rigidly attached to the shell 29, of the reproducer.

the diaphragm would be deprived of that flexibility or resilience so necessary for the propagation of vocal waves; and accordingly we secure the end of each wire 25, to a washer 30, bearing upon a spring 31, within a hollow screw 34. It will be seen that while the tension upon the diaphragm may be altered by means of the screws 34, the springs 31 will always insure the necessary flexibility and resiliency.

To further enhance the efficiency of our reproducer we augment the vibrations of the diaphragm by means of sonorous wires 35, preferably two, stretched below the diaphragm between the opposite walls of the reproducer. The ends of the wires pass through openings in adjusting screws 37 and are headed or upset against the outer ends thereof so that the screws can be turned without twisting the wires. Now by means of the adjusting screws 34 and 37, the diaphragm and sonorous wires 35, can be tuned to vibrate in harmony or synchronism. The rhythm of vibrations between diaphragm and sonorous wires results in augmenting the natural vibrations produced by the needle and adding greatly, not only to the volume of sound, but also to the clearness and distinctness of the vocal expressions.

The tracing point of the needle may be made of a filament of glass pressed into the end of the needle. The sound is conveyed through the tube 38, to the horn 4, and in order that any jar or vibrations from the horn, may not be transmitted to the tube, a section of rubber tubing 39 is interposed. The sound box may be supported by a hinged bracket 43 attached to the frame.

We have shown for purposes of illustration a spring-motor device to rotate the record cylinder, although it is obvious that an electric motor or other motor element may be employed. The spider 18, carrying the record-cylinder, is mounted in the plate or frame 40, and carries a pulley 41, belted to the drive-wheel 42, which is connected by means of pinion 44 and gear 45 to the spring barrel 47.

For the purpose of placing the spring within the barrel 47, under tension, we provide a winding mechanism operated by the handle 2. The stem 2^a is spirally grooved and engages a pin 48 in the sleeve 49, secured to the bevel gear 50, in mesh with the pinion 51, which is sleeved upon the main spring shaft 52. When the handle 2 is pressed down, the gear 50 and pinion 51 will rotate the shaft 52 and wind the main spring, but upon releasing the handle, the stem 2^a will be raised by the spiral spring 54, the spring 55 permitting the pinion 51 to yield as the teeth on the outer end of the sleeve glide over the teeth of the ratchet cap 58 on the end of the shaft 52. The shaft of the spring barrel carries a ratchet 60,

which is engaged by the pivoted pawl 61, held in engagement therewith by the spring 62 to regulate the speed of rotation of the barrel and operating mechanism connected therewith.

Instead of using a ratchet clutch between the bevel gears and the shaft of the winding drum as above described, we may fasten the pinion 51 rigidly to the shaft 52, thereby dispensing with the spring 55 and clutch 58. In this case we provide the frame with a depending sleeve 49^a integral with the gear 50 and surrounding the sleeve 49 in the manner shown in Fig. 7. The sleeve 49 in this case is constructed to be free from the gear 50, and may be provided with projecting teeth or lugs 50^a which are adapted to enter depressions or sockets 50^b in the upper edge of the sleeve 49^a to lock the parts together. When the stem 2^a is depressed, the sleeves 49 and 49^a will be locked together, but upon the reverse movement of the stem the sleeve 48 will be lifted slightly and disengaged from the sleeve 49^a, so that it will be free to revolve without affecting the gear. It is obvious that other changes may be made and that different devices may be employed to actuate the winding drum.

The operation of the mechanism will be understood from the foregoing description. When the handle 2 is pressed down, the main spring will be wound and will immediately set the record cylinder in operation through the gears and belt pulleys and cause the phonographic reproducer to send out the vocal warning signal such, for instance, as—"danger—look out—automobile coming", or any other appropriate signal which has been recorded upon the cylinder. The signal will be repeated a number of times for each winding of the spring, and unless a speed regulator is attached, the rotary speed of the mechanism will increase rapidly at first and then diminish, thus enhancing the alarming nature of the signal.

Our invention will now be appreciated by reason of the several features which render it of especial value as a warning signal. The vocal warning cry appeals not only to the hearing but instantly to the reason of the pedestrian, while the repetition of the warning call with varying speed causes a startling effect which is most effective. In addition to this, the increased volume and distinctness of the sound waves produced in the sound box by the harmonic vibrations of the sonorous wires, together with the shock-absorbing media which protect the reproducing mechanism from external shocks, render our apparatus most effective for the purposes described.

While we have described in detail the mechanism disclosed in the drawings for the purpose of showing an embodiment of our invention, it will be obvious, as pre-

viously pointed out, that many changes may be made therein without departing from the spirit of our invention, and such changes will be within the scope of our claims, which are:—

1. A signal device for automobiles, comprising a casing, a phonographic reproducer and operating mechanism therefor within said casing, shock-absorbing media interposed between said reproducer and operating mechanism and the walls of said casing, said media being maintained normally under compression, socket plates interposed between said media and the casing above said reproducer and mechanism, and adjusting devices operatively connected to said plates.

2. A signal device for automobiles, comprising a casing, a phonographic reproducer and operating mechanism therefor within said casing, a cushioning support constituting an under-base upon which said reproducer and said mechanism are mounted, springs interposed between said under-base and the lower wall of the casing, springs located above said mechanism acting in opposition to said first-named springs, and shock-absorbing media interposed between

other walls of said casing and the reproducer and said mechanism.

3. A signal device for automobiles, comprising a casing, a phonographic reproducer and operating mechanism therefor within said casing, shock-absorbing devices interposed between said reproducer and operating mechanism and said casing, said devices being maintained normally under compression, there being corresponding devices above and below the said reproducer and mechanism, and means for adjusting the amount of compression upon said devices.

4. A signal device for vehicles comprising a polygonal casing, a phonographic sound producer therein, actuating mechanism therefor, and shock absorbing means interposed between said sound producer and each side of the casing.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

ARTHUR W. WASHBURN.
CHARLES D. KEELER.

Witnesses:

W. H. CRAVEN,
M. A. FORD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

The first of the two main divisions of the system is the *Proterozoic*, which is further divided into the *Archaean* and the *Proterozoic*. The *Archaean* is the older of the two, and is characterized by the presence of *granite* and *gneiss*. The *Proterozoic* is the younger of the two, and is characterized by the presence of *schist* and *slate*.

The second of the two main divisions of the system is the *Phanerozoic*, which is further divided into the *Palaeozoic* and the *Neozoic*. The *Palaeozoic* is the older of the two, and is characterized by the presence of *trilobites* and *corals*. The *Neozoic* is the younger of the two, and is characterized by the presence of *dinosaurs* and *mammals*.

The *Proterozoic* and the *Phanerozoic* are the two main divisions of the system.

The *Proterozoic* is the older of the two, and is characterized by the presence of *granite* and *gneiss*.

The *Phanerozoic* is the younger of the two, and is characterized by the presence of *trilobites* and *corals*.

The *Palaeozoic* is the older of the two, and is characterized by the presence of *trilobites* and *corals*. The *Neozoic* is the younger of the two, and is characterized by the presence of *dinosaurs* and *mammals*.

The *Proterozoic* and the *Phanerozoic* are the two main divisions of the system.

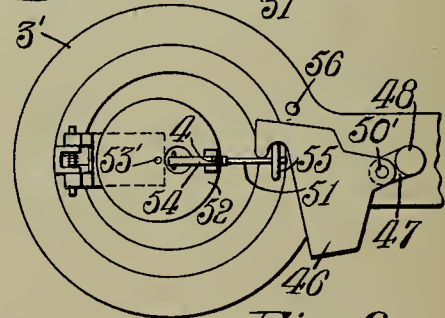
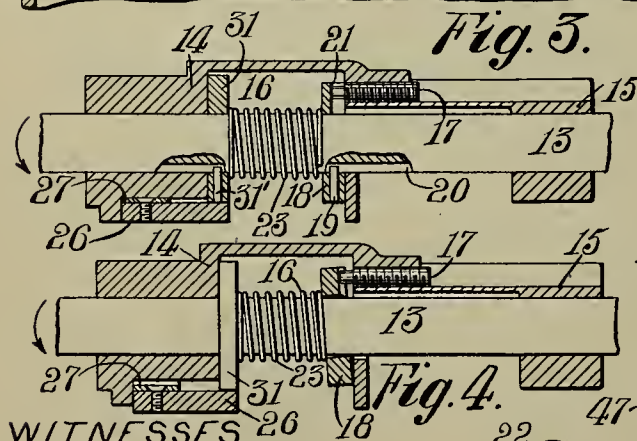
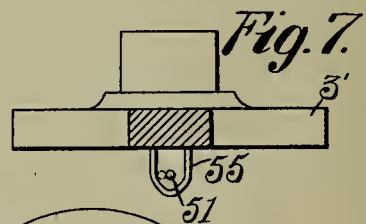
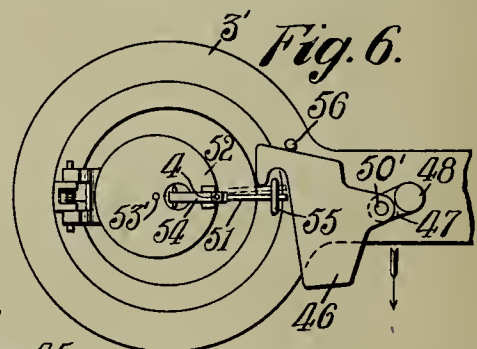
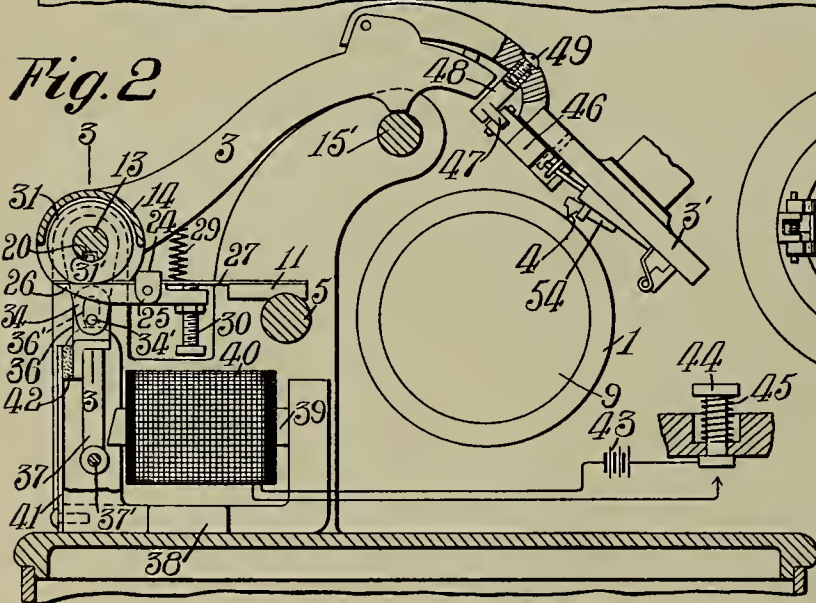
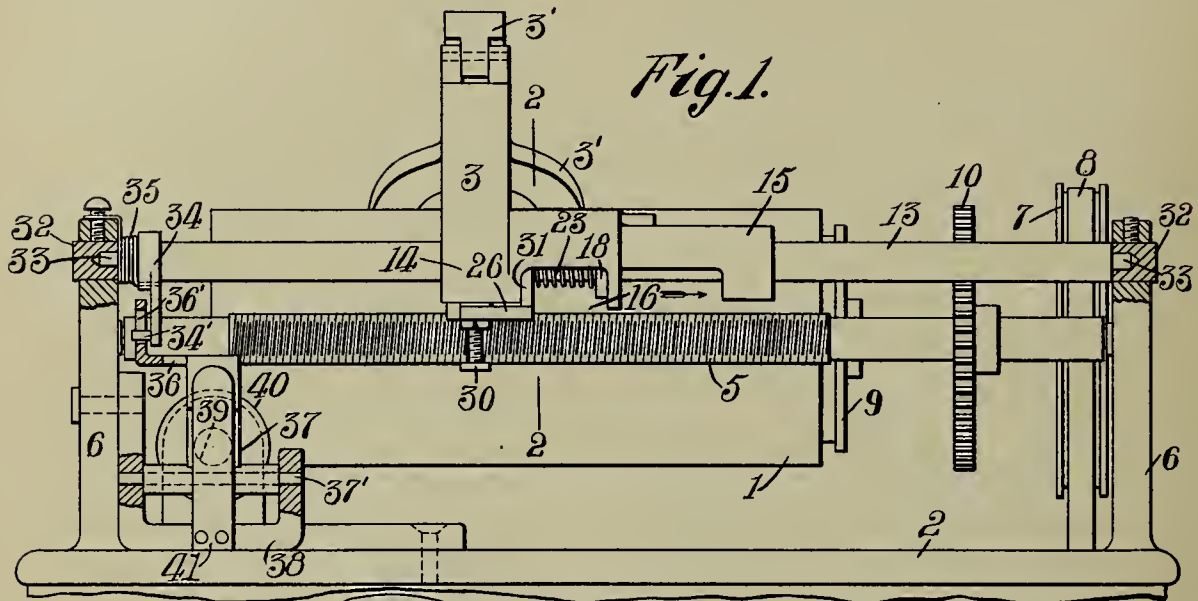
PHONOGRAPH,

#1,178,014-----N. H. Holland,
Patented-April 4th, 1916.
Filed-July 13th, 1914.

N. H. HOLLAND.
 PHONOGRAPH.
 APPLICATION FILED JULY 13, 1914.

1,178,014.

Patented Apr. 4, 1916.



WITNESSES
J. A. Brophy
G. H. Mey



Fig. 9.
 INVENTOR
N. H. Holland
 BY *Dyer & Holden*
 HIS ATTORNEYS

UNITED STATES PATENT OFFICE.

NEWMAN H. HOLLAND, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

1,178,014.

Specification of Letters Patent.

Patented Apr. 4, 1916.

Application filed July 13, 1914. Serial No. 850,603.

To all whom it may concern:

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of West Orange, Essex county, New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and more particularly to phonographs of the business or commercial type, and comprises an improvement upon a device or combination of devices described in my copending application. Serial No. 818,892, filed February 16, 1914.

It has for its principal object the provision of improved means whereby the reproducer stylus of the phonograph can be moved or spaced back for the purpose of causing the repetition of any portion of the record whenever the operator who is transcribing the record so desires. This object is attained by means of a construction whereby the reproducing stylus can be shifted back over part of the record to repeat the same without the necessity of being lifted from the record, this construction greatly facilitating the rapidity and efficiency of operation of the back spacing device. I have found that in back spacing the reproducer stylus, the forwardly projecting pin, which is commonly used with a U-shaped loop to limit the lateral and the downward movement of the stylus lever, does not assume a central position in the loop, but remains in contact with the side of the loop, whereby the flexibility of movement of the stylus lever is impaired.

A further object of my invention is to provide means by which the reproducing stylus is always compelled to assume a central position in relation to its mounting after the stylus has been slid across the record. With this object in view, I preferably employ a weight or gravity arm which forces the stylus lever to assume a central position when the reproducer stylus has been moved or spaced along the record.

The drawing illustrates one embodiment of my invention, the same reference characters being used to designate the same parts in all the views.

In said drawings—Figure 1 is a rear elevation, partly in section, of said embodiment of my invention; Fig. 2 is a transverse vertical section taken on the line 2—2 of Fig. 1; Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 2; Fig. 4 is a view similar to Fig. 3, showing the same parts in a slightly different position; Fig. 5 is a perspective view of one of the elements of the back spacing means; Fig. 6 is a bottom plan view of a part of said embodiment of my invention; Fig. 7 is a view partly in elevation and partly in cross section of a portion of the device shown in Fig. 6; Fig. 8 is a view similar to Fig. 6 showing certain parts in a slightly different position; and Fig. 9 is a horizontal view of a constructional detail.

In the drawing, the numeral 1 designates a phonograph record or blank which is rotatably mounted upon a frame or support 2. In proximity to this record is an arm or traveling carriage 3 which supports a pivoted frame 3' in which the recorder and reproducer are mounted. The reproducer and recorder may be of any suitable construction, the numeral 4 designating the reproducer stylus which is adapted to track the grooves in the record 1. A suitable form of reproducer is disclosed in my application Serial No. 776,463, filed June 30, 1913, and entitled phonograph reproducers. A feed screw 5 is mounted in bearings formed in standards 6 which project upwardly from the top of the table 2. A pulley 7, over which runs a driving belt 8, operated by any suitable means, imparts rotation to the mandrel 9 through the mandrel shaft (not shown). The mandrel carries the record or blank 1. The feed screw 5 carries a gear 10 which meshes with a similar gear (not shown) on the mandrel shaft whereby rotation may be imparted to the feed screw in a manner well known in the phonograph art. The feed screw coacts with a feed nut 11 connected to the arm 3 to move the latter and the parts carried thereby along the record or blank 1.

The arm 3 and the structure supported thereby is mounted to slide along a rotatable back rod or rock shaft 13 and for this purpose the arm is provided with a hub 14

having an extension 15, the hub 14 and extension 15 being both slidable and rotatable on said rod. The forward end of arm 3 slides upon a guide rod 15' running from one side of the machine to the other. The hub 14 is provided with an enlarged opening or recess 16 for receiving certain elements hereinafter referred to. As shown in Fig. 1, the extension 15 is of less outside diameter than the hub 14, a shoulder being thus formed at the inner end of the extension 15. Through a screw threaded opening in this shoulder passes a small screw 17, the inner end of which projects into the opening or recess 16 and engages an annular cam disk 18, which is mounted to move along the spindle 13 with the arm 3. The inside diameter of this disk is slightly larger than the diameter of the spindle 13, and into the central opening through the disk projects a radially disposed pin 19 which engages a keyway 20 extending along the spindle 13 substantially from one end to the other thereof. This pin causes the cam disk 18 to rotate with the spindle 13 whenever the same is rocked, no matter at what point along the spindle 13 the cam disk may be, while at the same time leaving the cam disk free to slide along the spindle as much as necessary. On the face of disk 18 which is turned toward the screw 17, this disk is provided with a recess 21, one edge of which is abrupt or at right angles to the face of the disk and the other of which is inclined to said face, as shown at 22 in Fig. 5. This recess receives the projecting end of the screw 17, and the parts are arranged in such a way as to cause the disk to abut against the side of the recess through which the screw 17 projects and the inner end of this screw to rest against the abrupt side of the notch 21 when the disk has its pin engaging the keyway 20 and the arm 3 is moving along the record or blank 1.

With the above construction in view it will now be clear that if the back rod or shaft 13 is rocked in the direction shown by the arrows on Figs. 3 and 4, the arm 3 and the hub 14 and extension 15 being loose on the shaft and not engaging the keyway 20 will not be rocked with the shaft 13, but the cam disk 18 will be moved so as to carry the inclined edge 22 of the recess over the inner end of the screw 17. Owing to the fact that the opening through the cam disk is slightly larger than the diameter of the rod 13, the first effect of this movement is to tilt or cant the disk from the position shown in Fig. 3 to the position shown in Fig. 4 in which latter position the cam disk binds or "bites" upon the rod 13, and cannot be tilted on the rod or pushed along the same any farther. If, however, the rod 13 rotates a little more, the inclined edge 22 of the recess 21 now has a cam action on the screw

17 and produces bodily movement of the arm 3 through the hub 14 and the extension 15. This bodily movement carries the arm 3 to the right, as shown by the arrow in Fig. 1, and as the arm 3 is not lifted in the rocking of the rod 13, the stylus 4 is not lifted, but slides or skids along the record 1 until it again comes to rest in one of the sound wave grooves at a point which it has already passed. In the operation of my invention, when the spindle 13 is released and moved back to its original position, the cam washer moves back with it and the parts resume the relative positions shown in Figs. 4 and 6. In this way, the stylus is spaced back to a position from which it is ready to repeat a part of the record. A compression spring 23, encircling the rod 13 in the recess 16, engages at one end with the cam disk 18 and holds it in position to act upon the screw 17 at all times, in the manner above set forth.

When the arm 3 is to be shifted back, it is necessary to disengage the feed nut 11 from the feed screw 5. For this purpose, my invention comprises a part 24 projecting from hub 14 and having downturned lugs 25 between which is pivotally mounted a lever 26. This lever 26 carries a spring arm 27 which extends toward the screw 5, and carries at its outer end the feed nut 11, which engages the upper portion of the feed screw 5. So long as the threaded shaft 5 turns clock-wise, viewing the same from the right on Fig. 1, the arm 3, with the parts carried thereby, will be moved along the spindle 13 to the left, because of the engagement of the feed nut with the feed screw. When the feed nut 11 is lifted from the feed screw, the arm 3 is free to move backward. A spring 29 secured at its upper end to the arm 3 presses downward upon the arm 27 and holds the feed nut against the feed screw, an adjusting screw 30 passing through the lever 26 from below and engaging the lower side of the spring-arm 27 to adjust the position of the feed nut with respect to lever 26 and feed screw 5. The feed nut 11 is adapted to be lifted from the feed screw 5 by means of a cam 31 located in recess 16 and mounted on rod 13, cam 31 having a pin 31' similar to the pin 19 of the washer 18 to engage the keyway 20. This cam is engaged by the spring 23 and is forced by it against the side of the recess 16 opposite that occupied by disk 18. One side of the lever 26 overlaps the edge of this recess as shown in Figs. 1 and 4, and this portion of the lever 26 is moved by the cam when the spindle 13 and cam 31 are rocked through a certain angle, to press the rear end of the lever 26 downwardly against the force of the spring 29 to lift the feed nut 11 from the feed screw 5. The cam 31 slides with the arm 3 along the rod 13 and can be turned

UNITED STATES PATENT OFFICE.

NEWMAN H. HOLLAND, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

1,178,014.

Specification of Letters Patent.

Patented Apr. 4, 1916.

Application filed July 13, 1914. Serial No. 850,603.

To all whom it may concern:

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of West Orange, Essex county, New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and more particularly to phonographs of the business or commercial type, and comprises an improvement upon a device or combination of devices described in my copending application. Serial No. 818,892, filed February 16, 1914.

It has for its principal object the provision of improved means whereby the reproducer stylus of the phonograph can be moved or spaced back for the purpose of causing the repetition of any portion of the record whenever the operator who is transcribing the record so desires. This object is attained by means of a construction whereby the reproducing stylus can be shifted back over part of the record to repeat the same without the necessity of being lifted from the record, this construction greatly facilitating the rapidity and efficiency of operation of the back spacing device. I have found that in back spacing the reproducer stylus, the forwardly projecting pin, which is commonly used with a U-shaped loop to limit the lateral and the downward movement of the stylus lever, does not assume a central position in the loop, but remains in contact with the side of the loop, whereby the flexibility of movement of the stylus lever is impaired.

A further object of my invention is to provide means by which the reproducing stylus is always compelled to assume a central position in relation to its mounting after the stylus has been slid across the record. With this object in view, I preferably employ a weight or gravity arm which forces the stylus lever to assume a central position when the reproducer stylus has been moved or spaced along the record.

The drawing illustrates one embodiment of my invention, the same reference characters being used to designate the same parts in all the views.

In said drawings—Figure 1 is a rear elevation, partly in section, of said embodiment of my invention; Fig. 2 is a transverse vertical section taken on the line 2—2 of Fig. 1; Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 2; Fig. 4 is a view similar to Fig. 3, showing the same parts in a slightly different position; Fig. 5 is a perspective view of one of the elements of the back spacing means; Fig. 6 is a bottom plan view of a part of said embodiment of my invention; Fig. 7 is a view partly in elevation and partly in cross section of a portion of the device shown in Fig. 6; Fig. 8 is a view similar to Fig. 6 showing certain parts in a slightly different position; and Fig. 9 is a horizontal view of a constructional detail.

In the drawing, the numeral 1 designates a phonograph record or blank which is rotatably mounted upon a frame or support 2. In proximity to this record is an arm or traveling carriage 3 which supports a pivoted frame 3' in which the recorder and reproducer are mounted. The reproducer and recorder may be of any suitable construction, the numeral 4 designating the reproducer stylus which is adapted to track the grooves in the record 1. A suitable form of reproducer is disclosed in my application Serial No. 776,463, filed June 30, 1913, and entitled phonograph reproducers. A feed screw 5 is mounted in bearings formed in standards 6 which project upwardly from the top of the table 2. A pulley 7, over which runs a driving belt 8, operated by any suitable means, imparts rotation to the mandrel 9 through the mandrel shaft (not shown). The mandrel carries the record or blank 1. The feed screw 5 carries a gear 10 which meshes with a similar gear (not shown) on the mandrel shaft whereby rotation may be imparted to the feed screw in a manner well known in the phonograph art. The feed screw coacts with a feed nut 11 connected to the arm 3 to move the latter and the parts carried thereby along the record or blank 1.

The arm 3 and the structure supported thereby is mounted to slide along a rotatable back rod or rock shaft 13 and for this purpose the arm is provided with a hub 14

having an extension 15, the hub 14 and extension 15 being both slidable and rotatable on said rod. The forward end of arm 3 slides upon a guide rod 15' running from one side of the machine to the other. The hub 14 is provided with an enlarged opening or recess 16 for receiving certain elements hereinafter referred to. As shown in Fig. 1, the extension 15 is of less outside diameter than the hub 14, a shoulder being thus formed at the inner end of the extension 15. Through a screw threaded opening in this shoulder passes a small screw 17, the inner end of which projects into the opening or recess 16 and engages an annular cam disk 18, which is mounted to move along the spindle 13 with the arm 3. The inside diameter of this disk is slightly larger than the diameter of the spindle 13, and into the central opening through the disk projects a radially disposed pin 19 which engages a keyway 20 extending along the spindle 13 substantially from one end to the other thereof. This pin causes the cam disk 18 to rotate with the spindle 13 whenever the same is rocked, no matter at what point along the spindle 13 the cam disk may be, while at the same time leaving the cam disk free to slide along the spindle as much as necessary. On the face of disk 18 which is turned toward the screw 17, this disk is provided with a recess 21, one edge of which is abrupt or at right angles to the face of the disk and the other of which is inclined to said face, as shown at 22 in Fig. 5. This recess receives the projecting end of the screw 17, and the parts are arranged in such a way as to cause the disk to abut against the side of the recess through which the screw 17 projects and the inner end of this screw to rest against the abrupt side of the notch 21 when the disk has its pin engaging the keyway 20 and the arm 3 is moving along the record or blank 1.

With the above construction in view it will now be clear that if the back rod or shaft 13 is rocked in the direction shown by the arrows on Figs. 3 and 4, the arm 3 and the hub 14 and extension 15 being loose on the shaft and not engaging the keyway 20 will not be rocked with the shaft 13, but the cam disk 18 will be moved so as to carry the inclined edge 22 of the recess over the inner end of the screw 17. Owing to the fact that the opening through the cam disk is slightly larger than the diameter of the rod 13, the first effect of this movement is to tilt or cant the disk from the position shown in Fig. 3 to the position shown in Fig. 4 in which latter position the cam disk binds or "bites" upon the rod 13, and cannot be tilted on the rod or pushed along the same any farther. If, however, the rod 13 rotates a little more, the inclined edge 22 of the recess 21 now has a cam action on the screw

17 and produces bodily movement of the arm 3 through the hub 14 and the extension 15. This bodily movement carries the arm 3 to the right, as shown by the arrow in Fig. 1, and as the arm 3 is not lifted in the rocking of the rod 13, the stylus 4 is not lifted, but slides or skids along the record 1 until it again comes to rest in one of the sound wave grooves at a point which it has already passed. In the operation of my invention, when the spindle 13 is released and moved back to its original position, the cam washer moves back with it and the parts resume the relative positions shown in Figs. 4 and 6. In this way, the stylus is spaced back to a position from which it is ready to repeat a part of the record. A compression spring 23, encircling the rod 13 in the recess 16, engages at one end with the cam disk 18 and holds it in position to act upon the screw 17 at all times, in the manner above set forth.

When the arm 3 is to be shifted back, it is necessary to disengage the feed nut 11 from the feed screw 5. For this purpose, my invention comprises a part 24 projecting from hub 14 and having downturned lugs 25 between which is pivotally mounted a lever 26. This lever 26 carries a spring arm 27 which extends toward the screw 5, and carries at its outer end the feed nut 11, which engages the upper portion of the feed screw 5. So long as the threaded shaft 5 turns clock-wise, viewing the same from the right on Fig. 1, the arm 3, with the parts carried thereby, will be moved along the spindle 13 to the left, because of the engagement of the feed nut with the feed screw. When the feed nut 11 is lifted from the feed screw, the arm 3 is free to move backward. A spring 29 secured at its upper end to the arm 3 presses downward upon the arm 27 and holds the feed nut against the feed screw, an adjusting screw 30 passing through the lever 26 from below and engaging the lower side of the spring-arm 27 to adjust the position of the feed nut with respect to lever 26 and feed screw 5. The feed nut 11 is adapted to be lifted from the feed screw 5 by means of a cam 31 located in recess 16 and mounted on rod 13, cam 31 having a pin 31' similar to the pin 19 of the washer 18 to engage the keyway 20. This cam is engaged by the spring 23 and is forced by it against the side of the recess 16 opposite that occupied by disk 18. One side of the lever 26 overlaps the edge of this recess as shown in Figs. 1 and 4, and this portion of the lever 26 is moved by the cam when the spindle 13 and cam 31 are rocked through a certain angle, to press the rear end of the lever 26 downwardly against the force of the spring 29 to lift the feed nut 11 from the feed screw 5. The cam 31 slides with the arm 3 along the rod 13 and can be turned

by this spindle when the arm 3 is in any position longitudinally of the said rod, the same as the cam washer 18.

In order to permit rocking or rotation of the rod 13 through a sufficient angle to operate the cam 31, to free the arm from the feed screw 5, and to operate the disk 18 to shift the arm 3 backward, I mount the rod 13 in bearing blocks 32, secured in the upper ends of the standards 6 and provided with bores which receive journals or trunnions 33 at the ends of the rod 13. I also secure to one end of the shaft an operating arm 34 which is fixed thereon so that when the arm is actuated, the shaft 13 must rock. This arm is engaged by a spring 35, which is made fast thereto at one end, and, after encircling the shaft 13, is fixed at the other end to the top of the adjacent standard 6. Normally, this spring holds the arm in such position that it extends vertically downward, so as to keep the keyway 20 on the under side of the shaft and the feed nut 11 in engagement with the feed screw. In order to provide means for moving the arm 34 and rocking rod 13, I connect the said arm to the armature of an electromagnet, which is in circuit, with a suitable source of electricity, the circuit being adapted to be closed to energize the magnet whenever the operator desires. This armature is provided at its upper end with a member 36, said member having an elongated slot 36' containing a pin 34' on arm 34. The armature is shown at 37 supported to extend upward from a suitable pivot 37' in a frame 38 on the table 2. This frame also carries the core 39 and coil 40 in position to attract the armature 37; and also secured to this frame is an upwardly extending spring arm 41, having a cushion 42 on its upper end to act as a buffer for the member 36 and prevent the spring 35 from moving the arm 34 beyond vertical position when the armature is not attracted by the magnet. The magnet is supplied with current from the suitable source of electricity, such as a battery 43, and the circuit is arranged to be opened and closed by means of a switch 44. The preferred construction for this switch is disclosed and claimed in my copending application Serial No. 818,894, filed February 16, 1914.

Upon the frame 3' and back of the stylus 4 a weight or gravity arm 46 is pivotally mounted upon a lug 47 projecting from a downwardly projecting pin 48, said pin being rigidly connected, as by means of a screw 49, to the frame 3'. The pivotal mounting of the weight arm is shown in detail in Fig. 9, in which numerals 50, 50' indicate the pivot pins. Numeral 51 indicates a pin projecting from the reproducer weight 52, which is pivoted for lateral movement at 53' and carries the stylus lever 54. Lateral movement of the pin 51, weight

52, and lever 54 is limited by the loop 55. Numeral 56 indicates a small pin rigidly mounted in frame 3' for limiting the lateral movement of weight or gravity arm 46 in one direction.

The following is a description of the operation of my invention: The driving mechanism for the phonograph being set into operation, the stylus 4 will run along through the grooves in the record 1 in the manner required to accurately reproduce the record. If, however, the operator should fail to understand fully any part of the record, and for this or any other reason should desire to have a part of the record repeated, it is only necessary to close the switch 44 to produce this result. The closing of the switch energizes the coil 40 which thereupon attracts the armature 37 and causes the same to swing the arm 34 to the right, viewing the apparatus as shown in Fig. 2, the arm 34 rotating the shaft 13 through a certain angle. Through the keyway 20 in the shaft 13, the cam 31 is rotated to press down the rear end of lever 26 and raise the feed nut 11 from the feed screw 5. At the same time, the shaft rotates the cam disk 18, with the result that the cam disk is first tilted because of the action of the cam surface 22 on the inner end of the screw 17 into binding engagement with rod 13, as shown in Fig. 4, the further rotation of the shaft causing the cam surface 22 to exert a thrust on the screw 17 to shift the arm 3, with the parts carried thereby, in a backward direction, shown as above mentioned, by the arrow on Fig. 1. The parts are so designed that the binding of the disk 18 on the rod 13 takes place before the rocking of the rod 13 by the arm 34 is finished. Since the arm 3 is not raised when shifted back, the stylus 4 is caused to slip or skid along the surface of the record across the record grooves during the back spacing operation, but as the stylus is rounded, it does not scratch the record or otherwise mar the same. The switch 44 is then reopened whereupon the magnet releases the armature 37 and the spring 35 rocks the arm 34 back to vertical position, causing the member 36 to abut against the cushion 42 on the spring arm 41. The rotation of the arm 34 causes the rod 13 to return to its normal position, the feed nut 11 being thus moved back into engagement with the feed screw 5 and the cam disk 18 assuming the position shown in Figs. 1 and 3. The apparatus is now ready to repeat a part of the record. The whole operation of shifting back is instantaneously effected by pressing upon the switch 44, which may be automatically opened, as by a spring 45, when the pressure thereon is removed. The stylus is spaced back a given amount each time the switch is closed. If the stylus is not spaced back far enough upon one closure of the

switch, the necessary amount of back spacing can be obtained by closing the switch a number of times.

It has been found, as hereinbefore stated, that frequently in the back spacing movement during which the stylus slides or glides across the grooves, the pin 51 does not assume a central position in the U-shaped loop 55, but rests against one side of the said loop, assuming the position shown in Figs. 6 and 7 by the dotted lines. By the employment of the pivoted weight arm 46, I have succeeded in obviating this difficulty. By referring to Figs. 6 to 8, the operation of this arm will readily become apparent. During the back spacing operation, the weight 46 rests against pin 56 until the backward movement of the arm 3 is arrested. When this happens, the weight 46, impelled by its energy and momentum, will be projected about pivots 50, 50' in the direction indicated by the arrow in Fig. 6. The lug of said gravity arm will then strike the pin 51, compelling it to assume its normal central position within the loop. Further forward movement of the gravity arm is prevented by its engagement with the U-shaped loop 55, as shown in Fig. 8. The weight 46 is so shaped and the center of gravity thereof so located that said weight will move by gravity about the inclined axis of the pivots 50 and 50' back to its normal position resting against the small projecting pin 56.

From the above description it will be seen that my invention is simple and will operate with rapidity, ease and certainty to produce the desired effect, at any point in the reproduction of the record, the cam disk 18 and the cam 31 moving along with the arm 3 and being capable of being operated instantaneously, regardless of the point where they may be on the shaft 13. Furthermore, the parts are comparatively few in number and there is little likelihood of the apparatus getting out of order. The gravity arm will always operate to place the stylus carrying pin in a position so that its free and flexible movement is assured. My invention, therefore, is of great commercial value and capable of satisfactory and long continued operation under the requirements and conditions of everyday use. The fact that the arm 3 is not raised when any part of the record is repeated, whereby the stylus is not lifted from the record but glides or skids over the surface thereof, is an important feature of my invention, the efficiency and simplicity of the apparatus thereby being increased. Furthermore, with phonographic back spacing or repeating apparatus heretofore commonly employed, in which the stylus is lifted from the record before being moved backwardly and after such backward movement is lowered upon the

record, the lowering of the stylus upon the record causes a mark to be produced upon the record, this mark producing a disagreeable sound when the record is reproduced. This objection is eliminated by causing the stylus to glide or skid along the record, as is done in my invention.

I wish to have it understood that the above description and the accompanying drawings disclose but one embodiment of my invention, and are, therefore, to be construed as being illustrative only.

Many changes may be made in the construction disclosed without departing from the spirit of my invention.

Having now described my invention, what I claim as new and desire to protect by Letters Patent of the United States is as follows:

1. In a phonograph, the combination of a support for a record, sound reproducing means comprising a stylus mounted for free lateral movement and adapted to track the record, means for shifting said stylus back toward the beginning of the record by causing the same to skid or glide over the surface of the record, and means for causing the stylus to assume a central position without lifting the same from the record, substantially as described.

2. In a phonograph, the combination of a support for a record, a sound reproducing device comprising a stylus mounted for free lateral movement and adapted to track the record, means for moving said device relatively to the record to feed the stylus along the record, means for rendering said moving means inoperative and for simultaneously shifting the stylus back toward the beginning of the record by causing the same to skid or glide over the surface of the record, and means for causing the stylus to assume a central position without lifting the same from the record, substantially as described.

3. In a phonograph, the combination of a support for a record, sound reproducing means comprising a stylus adapted to track the record, means for shifting said stylus back toward the beginning of the record by causing the same to skid or glide over the surface of the record, and means operable by momentum to cause the stylus to assume a central position, substantially as described.

4. In a phonograph, the combination of a support for a record, sound reproducing means comprising a stylus adapted to track the record, means for shifting said stylus back toward the beginning of the record by causing the same to skid or glide over the surface of the record, and means operable by momentum to cause the stylus to assume a central position without lifting the same from the record, substantially as described.

5. In a phonograph, the combination of a support for a record, sound reproducing

means comprising a stylus adapted to track the record, means for shifting said stylus back toward the beginning of the record by causing the same to skid or glide over the surface of the record, and a movable weight operable by momentum to cause the stylus to assume a central position, substantially as described.

6. In a phonograph, the combination of a support for a record, sound reproducing means comprising a stylus adapted to track the record, means for shifting said stylus back toward the beginning of the record by causing the same to skid or glide over the surface of the record, and a pivoted weight operable by momentum to cause the stylus to assume a central position, substantially as described.

7. In a phonograph, the combination of a support for a record, sound reproducing means comprising a stylus mounted for free lateral movement and adapted to track the record, means for shifting said stylus back toward the beginning of the record by causing the same to skid or glide over the surface of the record, and means for causing the stylus to assume a central position without lifting the same from the record, said centering means being arranged to return automatically to its normal position, substantially as described.

8. In a phonograph, the combination of a support for a record, sound reproducing means comprising a stylus adapted to track the record, means for shifting said stylus back toward the beginning of the record by causing the same to skid or glide over the surface of the record, and means operable by momentum to cause the stylus to assume a central position, said centering means being arranged to return automatically to its normal position, substantially as described.

9. In a phonograph, the combination of a support for a record, sound reproducing means comprising a stylus adapted to track the record, means for shifting said stylus back toward the beginning of the record by causing the same to skid or glide over the surface of the record, and a movable weight operable by momentum to cause the stylus to assume a central position, said weight being arranged to return automatically to its normal position by gravity, substantially as described.

10. In a phonograph, the combination of a support for a record, sound reproducing means comprising a stylus mounted for lateral movement and adapted to track the record, means for shifting said stylus back toward the beginning of the record by causing the same to skid or glide over the surface of the record, and means for causing

the stylus to assume a central position without lifting the same from the record, said centering means normally offering no resistance to the lateral movement of the stylus, substantially as described.

11. In a phonograph, the combination of a support for a record, a sound reproducing device comprising a stylus mounted for lateral movement and adapted to track the record, means for moving said device relatively to the record to feed the stylus along the record, means for rendering said moving means inoperative and for simultaneously shifting the stylus back toward the beginning of the record by causing the same to skid or glide over the surface of the record, and means for causing the stylus to assume a central position without lifting the same from the record, said centering means normally offering no resistance to the lateral movement of the stylus, substantially as described.

12. In a phonograph, the combination of a support for a record, sound reproducing means comprising a stylus mounted for lateral movement and adapted to track the record, means for shifting said stylus back toward the beginning of the record by causing the same to skid or glide over the surface of the record, and means for causing the stylus to assume a central position without lifting the same from the record, said centering means being arranged to return automatically to its normal position and normally offering no resistance to the lateral movement of the stylus, substantially as described.

13. In a phonograph, the combination of a support for a record, sound reproducing means comprising a stylus mounted for free lateral movement and adapted to track the record, electromagnetic means for shifting said stylus back toward the beginning of the record by causing the same to skid or glide over the surface of the record, and means for causing the stylus to assume a central position without lifting the same from the record, substantially as described.

14. In a phonograph, the combination of a support for a record, sound reproducing means comprising a stylus adapted to track the record, means for shifting said stylus back toward the beginning of the record, and means operable by momentum to cause the stylus to assume a central position, substantially as described.

This specification signed and witnessed this 10th day of July, 1914.

NEWMAN H. HOLLAND.

Witnesses:

FREDERICK BACHMANN,
MARY J. LAIDLAW.

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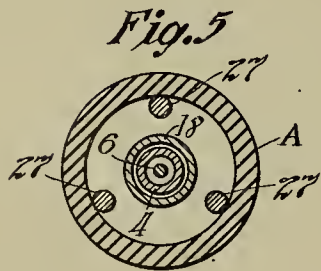
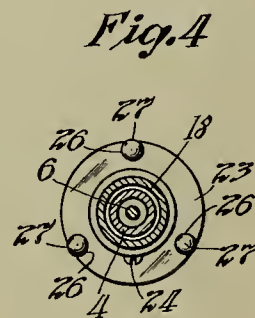
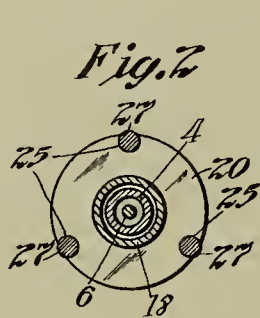
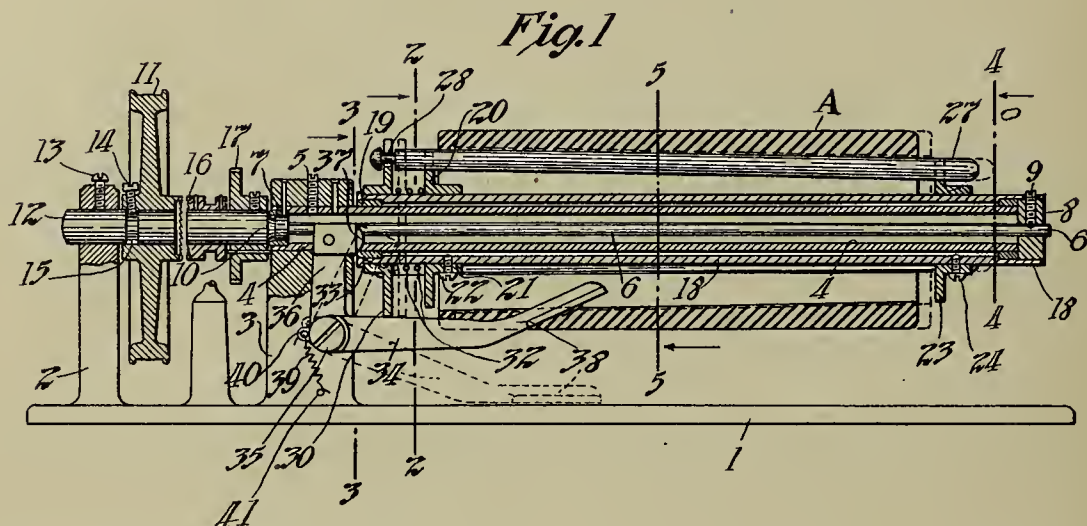
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PHONOGRAPH,
#1,178,061-----F. L. Dyer,
Patented-April 4th, 1916.
Filed-November 3rd, 1911.

F. L. DYER.
 PHONOGRAPH.
 APPLICATION FILED NOV. 3, 1911.

1,178,061.

Patented Apr. 4, 1916.



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Inventor:
Frank L. Dyer

UNITED STATES PATENT OFFICE.

FRANK L. DYER, OF MONTCLAIR, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

1,178,061.

Specification of Letters Patent.

Patented Apr. 4, 1916.

Application filed November 3, 1911. Serial No. 658,343.

To all whom it may concern:

Be it known that I, FRANK L. DYER, a citizen of the United States, and a resident of Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and more particularly to an improved record support or holder for such machines.

Ordinary phonograph records change in diameter to a considerable extent under different temperature conditions, expanding under heat and contracting under cold, whereas the supports or holders upon which the records are mounted change but little in diameter under the same conditions. As these supports or holders are so constructed that when the records are placed thereon a tight engagement will be maintained between the same and the records, it frequently happens that the records become so tightly locked in place under a decrease in temperature that it is difficult to remove them without damage to the record surface or breaking the records themselves. The object of my invention is to provide a record support or holder adapted to firmly hold the record and yet permit its ready removal, my invention being an improvement on that disclosed in an application of Newman H. Holland, filed October 6, 1911, Serial No. 653,155. In conformity with the above named object, I preferably provide a support or holder having elongated record engaging members extending longitudinally thereof and movable at an angle toward and away from the axis thereof.

My invention also contemplates the provision of means for imparting a quick and limited axial movement to the record holding means; so that upon the cessation of the axial movement of the said means, the momentum of the record tends to disengage the latter therefrom.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more fully understood, attention is hereby directed to the accompanying drawing illustrating the preferred embodiment of my invention, and in which—

Figure 1 represents a vertical longitudi-

nal section taken through the center of the mandrel of the phonograph embodying my invention, a part of the frame of the phonograph being shown in elevation; and Figs. 2, 3, 4 and 5 represent sections of the mandrel taken on lines 2—2, 3—3, 4—4, and 5—5 respectively of Fig. 1, Fig. 5 showing a record mounted upon the mandrel.

In all of the views corresponding parts are designated by the same reference numerals.

The phonograph to which my invention is shown applied in Fig. 1 is of well known construction and comprises a bed plate 1, provided with standards 2 and 3. Supported at one end in the standard 3 is a stationary tube or sleeve 4 secured rigidly in position, as by a set screw 5. The driving shaft 6 for the phonograph is mounted to extend through the tube 4, the left hand end of said shaft, as shown in Fig. 1, being rotatable within a bearing 7 in the corresponding end of the tube or sleeve 4. A collar or plug 8 secured to the right hand end of the shaft 6, as by a set screw 9 engages the corresponding end of the tube 4 and co-operates with the shaft enlargement 10 engaging the outer end of the bearing 7 to prevent the shaft from shifting longitudinally with respect to the tube 4. Power is transmitted to the driving shaft of the phonograph by means of a belt (not shown) encircling the pulley 11 rotatable on a shaft 12 which latter is secured to the standard 2 by a set screw or equivalent means 13. A screw 14 or equivalent means engages in the groove 15 in the shaft 12 to prevent movement of the pulley axially of the said shaft. The shaft 12 is axially in line with the shaft 6 to which it is adapted to be connected by a clutch 16 which is slidable back and forth upon the enlargement 10 of the driving shaft 6. Gear 17 is secured to the enlargement 10 of the shaft 6, and from this gear by connections (not shown) the feed of the phonograph is driven in the usual manner.

My improved record support or holder comprises a tubular shaft 18 secured at its outer end, as by the set screw 9, to the collar 8 so as to rotate with the shaft 6 and provide at its inner end with a bearing 19 whereby it is rotatably mounted upon the tube 4.

The numeral 20 designates a flange or

disk-like member provided with an integral collar 21 mounted upon the shaft 18 adjacent the inner end thereof and secured thereto as by a set screw 22. A second flange or disk-like member 23 similar to the member 20 is secured to the shaft 18 adjacent the outer end thereof, as by a set screw 24. A frame or support is thus formed for the record engaging members hereinafter referred to. The flange or disk-like member 20 is provided with a number of equally spaced openings 25, three being shown in the drawing, the flange or disk-like member 23 being provided with an equal number of similarly arranged openings 26, the centers of the openings 26 being located slightly nearer than those of the openings 23 to the axis of the record support or holder. Slidably mounted in each opening in the flange or disk-like member 20 and a corresponding opening in the flange or disk-like member 23 is a rod or member 27 adapted to engage the bore of a cylindrical phonograph record A. These rods, as shown, are preferably cylindrical in form; and, as more clearly shown in Figs. 2 and 4, the openings therefor in the members 20 and 23 extend throughout slightly more than a semi-circle so that the said rods 27 are retained against displacement laterally from the said flanges and at the same time extend slightly beyond the periphery of the latter, whereby each presents an unobstructed portion adapted to engage the bore of the record. By reason of the location of the openings 26 slightly nearer the axis of the support or holder than the openings 25, the support or holder formed by the rods 27 has a slight taper toward the outer end thereof, the rods 27 being inclined to the axis of the support or holder. It is evident that when said rods are shifted axially toward the outer end of the support or holder they at the same time move slightly inwardly and thereby become loosened or disengaged from the bore of a record supported thereon. By axial movement of the said rods in the opposite direction, the latter can be moved away from the axis of the support or holder and brought into firm engagement with the bore of the record.

In order to permit a simultaneous axial movement of the rods 27, I preferably provide the same with reduced necks 28 mounted within radial slots or openings 29 in a flange-like member 30, the latter being provided with a collar 31 whereby it is slidably mounted upon the inner end of the shaft 18 preferably between the flange or disk-like member 20 and the standard 3. A coiled compression spring 32 surrounding the shaft 18 between the members 20 and 30 serves to resiliently hold the flange 30 in engagement with the annular flange 33 at the inner end of the shaft 18. The movement of the member 30 toward the outer end of the support is

limited by the spring 32 and the member 20. The numeral 34 designates a bell crank lever pivoted as at 35 to the standard 2. This lever is preferably formed with an upwardly directed arm 36 provided at its upper end with a projection 37 adapted to be brought into engagement with the inner face of the member 30 to move the latter toward the outer end of the record holder when the arm 38 of the lever is depressed as shown in dotted lines in Fig. 1. The last named arm is preferably substantially horizontally directed for convenience of manual operation. A tension spring 39 connected with a projection 40 on the lever 34 and with a pin 41 on the standard 2 tends to hold the lever out of engagement with the member 30.

By depressing the horizontal arm of the lever, the member 30 and the rods 27 are shifted toward the outer end of the record support or holder, whereby the said rods are disengaged from the bore of the record. When the actuating force is removed from the horizontal arm of the lever, the latter and the member 30 are returned to their original positions by the springs 39 and 32 respectively. By imparting a quick thrust to the horizontal arm of the lever, the momentum of the record in moving toward the outer end of the holder materially facilitates the disengagement of the record from the rods 27 upon the cessation of the movement of the latter.

It is evident that the rods 27 may be made of any preferred shape and that numerous other modifications may be made in the specific structure disclosed without departing from the spirit of my invention. I wish, therefore, not to be limited to the exact details shown, but

What I claim as new and desire to protect by Letters Patent is as follows:—

1. In a phonograph, a record holder comprising a frame or support, and a plurality of elongated record engaging members slidable longitudinally in said frame or support and connected for simultaneous movement, substantially as described.

2. In a phonograph, a record holder comprising a frame or support, a plurality of record engaging members slidable longitudinally in said frame or support, and means for simultaneously moving said members in a given direction, longitudinally thereof, substantially as described.

3. In a phonograph, a record holder comprising a frame or support, a plurality of elongated record engaging members mounted in said frame or support and slidable longitudinally therein and toward and away from the axis of the holder, means comprising a single manually operable member for imparting movement to said record engaging members in one direction, and resilient means for imparting movement there-

to in the opposite direction, substantially as described.

4. In a phonograph, a record holder comprising a frame or support, and a plurality of elongated record engaging members mounted in said frame or support at an angle to the axis of the holder and connected for simultaneous sliding movement longitudinally in said frame or support, substantially as described.

5. In a phonograph, a record holder comprising a frame or support, a plurality of elongated record engaging members mounted in said frame or support at an angle to the axis of the holder and slidable longitudinally in said frame or support, and means for imparting movement to said members relatively to said frame or support, substantially as described.

6. In a phonograph, a record holder comprising a frame or support, a plurality of elongated record engaging members mounted in said frame or support at an angle to the axis of the holder and slidable longitudinally in said frame or support, manually operable means for imparting movement to said members in one direction, and resilient means for imparting movement thereto in the opposite direction, substantially as described.

7. In a phonograph, the combination of a rotatable shaft, a plurality of elongated record engaging members extending longitudinally thereof and arranged about the same at an angle thereto, and means for supporting said members from said shaft, the said members being movable relatively to said supporting means along their respective longitudinal axes, substantially as described.

8. In a phonograph, the combination of a rotatable shaft, a plurality of elongated record engaging members extending longitudinally thereof and arranged about the same at an angle thereto, and means for supporting said members from said shaft, the said members being slidable axially in said supporting means, substantially as described.

9. In a phonograph, the combination of a rotatable shaft, a plurality of elongated record engaging members extending longitudinally thereof and arranged about the

same at an angle thereto, means for supporting said members from said shaft, means comprising a single controlling member for imparting movement to said record engaging members along their respective longitudinal axes, and resilient means for imparting movement to said record engaging members in the opposite directions, substantially as described.

10. In a phonograph, the combination of a rotatable shaft, a plurality of spaced flange-like members projecting therefrom, and a plurality of elongated record engaging members extending longitudinally of said shaft at an angle thereto and mounted for axial movement in said flange-like members, substantially as described.

11. In a phonograph, the combination of a rotatable shaft, a plurality of spaced flange-like members projecting therefrom, a plurality of elongated record engaging members extending longitudinally of said shaft at an angle thereto and mounted for axial movement in said flange-like members, manually operable means for imparting simultaneous axial movement in one direction to said record engaging members, and resilient means for imparting movement thereto in the opposite direction, substantially as described.

12. In a phonograph, the combination of a rotatable shaft, a plurality of spaced flange-like members projecting therefrom, a plurality of elongated record engaging members extending longitudinally of said shaft at an angle thereto and mounted for axial movement in said flange-like members, a member slidable longitudinally of said shaft, and connected to said record engaging members to shift the same axially, a spring between said last named member and one of said flange-like members for resiliently opposing movement of said member in one direction, and means for moving said member against the action of said spring, substantially as described.

This specification signed and witnessed this 1st day of November 1911.

FRANK L. DYER.

Witnesses:

FREDERICK BACHMANN,
ANNA R. KLEHM.

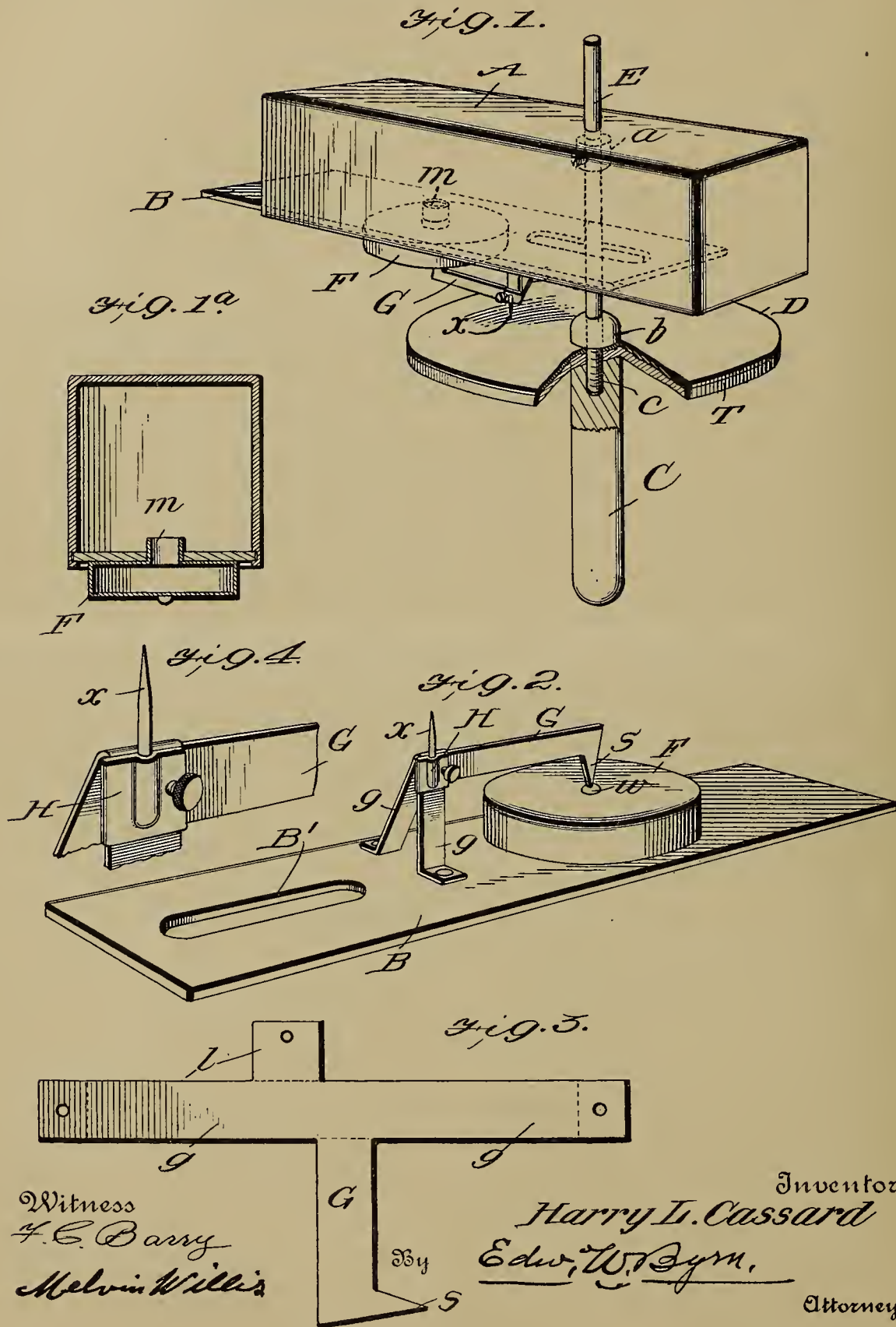
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH,
1,178,840-----H. L. Cassard,
Patented-April 11th, 1916.
Filed-July 21st, 1915.

H. L. CASSARD.
 PHONOGRAPH.
 APPLICATION FILED JULY 21, 1915.

1,178,840.

Patented Apr. 11, 1916.
 2 SHEETS—SHEET 1.



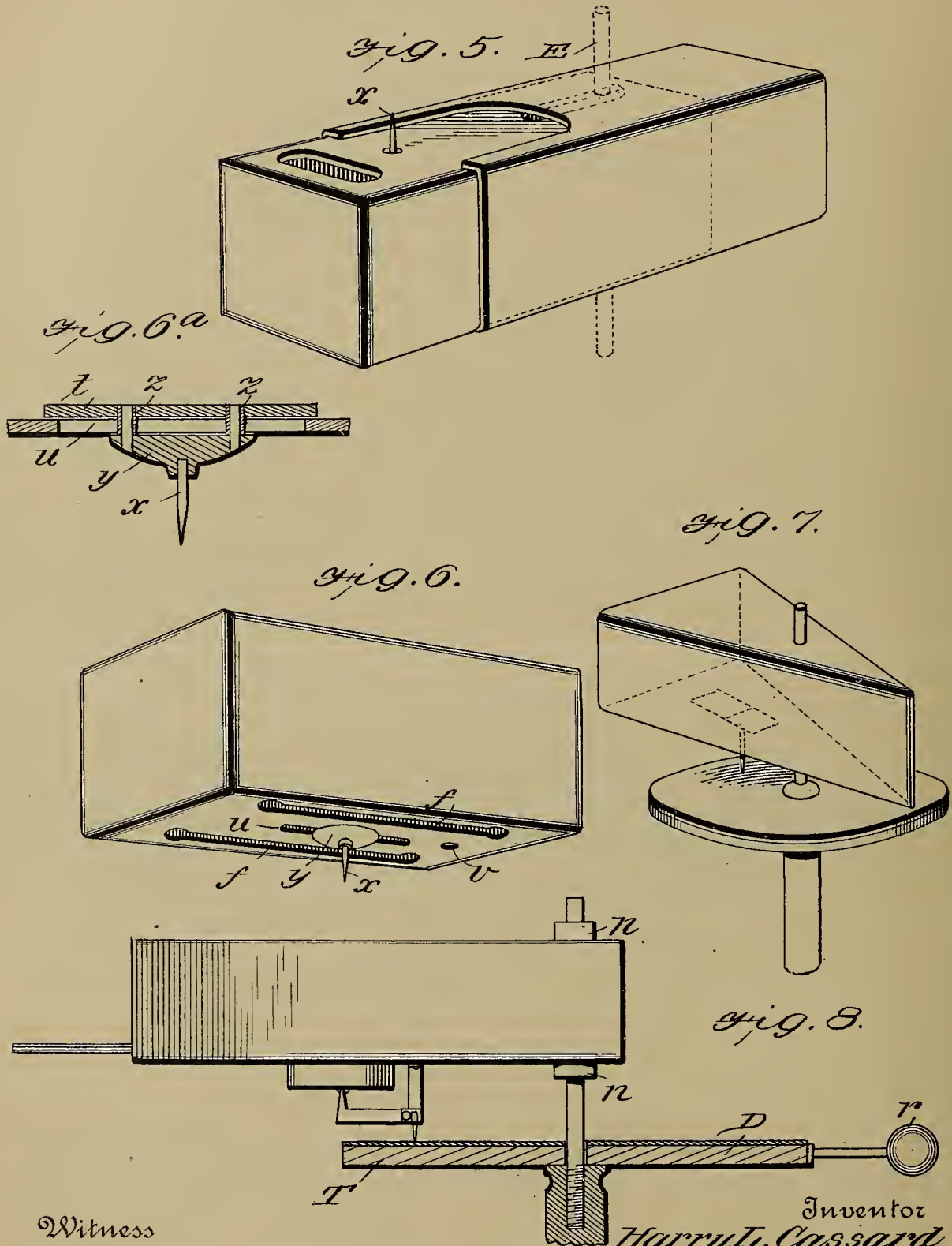
Witness
F. E. Barry
Melvin Willis

By

Inventor
Harry L. Cassard
Edw. W. Sym.
 Attorney

1,178,840.

Patented Apr. 11, 1916.
2 SHEETS—SHEET 2.



Witness
F. C. Barry
Melvin Willis

By

Edw. W. Dyer,

Attorney

Inventor
Harry L. Cassard

UNITED STATES PATENT OFFICE.

HARRY L. CASSARD, OF PHILADELPHIA, PENNSYLVANIA.

PHONOGRAPH.

1,178,840.

Specification of Letters Patent.

Patented Apr. 11, 1916.

Application filed July 21, 1915. Serial No. 41,107.

To all whom it may concern:

Be it known that I, HARRY L. CASSARD, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

My invention is designed to provide a talking machine or sound producing device of the kind known as phonographs, graphophones and gramophones.

It relates more particularly to the gramophone type in which a disk record is employed. My idea is to provide a cheap toy of this kind for reproducing articulate speech, music, songs, &c., in which, instead of a definitely driven motor mechanism, the device is to be held in the hand and the necessary movement for causing the traverse of the needle in the groove of the record is secured by a whirling action in the hand, one of the parts being eccentrically weighted to cause, by centrifugal action, a movement between the needle and the record. U. S. Patent No. 836,470 was granted to E. C. Smith for a device of this general character. My invention is designed to be an improvement upon this device, which permits of the use of cheap ten cent records and secures a much clearer and louder tone and at a less expense, as will be more fully described hereafter with reference to the drawing, in which:

Figure 1 is a perspective view of the complete device. Fig. 1^a is a sectional end view of the open end of the sound box. Fig. 2 is an enlarged under side view of the sliding bottom of the sound box and its attachments. Fig. 3 is a view of the blank from which the needle holder frame is fashioned. Fig. 4 is a view of the needle holder, and Figs. 5 to 8 are views showing modifications.

In the drawing, Fig. 1, A is a resonant box preferably square in cross section and of elongated form and open at one end. The bottom B of the box slides longitudinally in guideways at the lower longitudinal edges of the box.

D is an ordinary disk record of gramophone type which is clamped rigidly to a basic table T on handle C in right angular position.

E is an axial stem, screw threaded at its lower end *e* to enter the handle C in axial

position and having a small enlargement or flange *b* which clamps the disk to the end of the handle when the screw stem is turned in and which permits the quick and easy substitution of new disk records. A wooden block or hub *a* embraces the axial stem E within the box and is rigidly connected to the stem by a set-screw just beneath the top of the box so as to hold the box a predetermined distance above the disk record. On the lower side of the sliding bottom B of the box is rigidly mounted a light diaphragm F of the same general form and structure as the lid of a pill box made of any vibrating material, paper or cardboard serving the purpose for cheap construction. This diaphragm chamber opens into the box through a short tube *m*. Beside the diaphragm there is fixed to the bottom a three-part needle frame consisting of a horizontal member G and two angularly arranged legs *g g* which at their apex carry the needle *x* secured thereto by a needle holder H, which latter is indented on one side with a seat to hold the shank of the needle and which needle holder is clamped to the frame by a set-screw and is made to pinch and hold rigidly the needle. The horizontal member of the needle holding frame has at its outer end a spur *s* which rests against the diaphragm through the intermediary of a bit of wax *w*. For the cheap and convenient formation of this needle frame it is stamped in one piece of thin metal in the form of the blank shown in Fig. 3, the lug *l* of the blank in Fig. 3 forming, when bent around, the needle holder H of Figs. 2 and 4.

Referring now to Fig. 1, it will be seen that the sound box A turns freely on the stem E as an axis and the needle rests in the spiral groove of the record D, the center of gravity of the box being on one side of the axial stem, so that when the handle C is grasped in the hand and a whirling or gyratory motion is given to the box the latter swings around the axial stem E and the needle traverses the groove in the non-rotating disk and thus the record of the disk is reproduced by the vibrant quality of the diaphragm and sound box, which latter acts like a violin body to greatly amplify and clarify the sound, whether it be articulate speech or music.

In carrying out my invention I make various modifications of the same. Thus, for in-

stance instead of making the whole bottom of the box slidable, the box may be made in two telescopic or collapsible sections as in Fig. 5, one section being hung on the axial stem and the other being arranged to carry the needle and capable of progressive motion in radial direction to the central axis as the needle traverses the groove of the record. Furthermore, the sound box may be constructed as in Fig. 6, in which the box is closed on all sides and has slotted holes *f* like the *f*-holes of a violin, to let the sound out. In this case the needle *x* is attached to a button *y* and this, see Fig. 6^a, is connected by two rubber covered pins *z* to a slide *t* inside the box. The rubber covered pins *z* slide in a slot *u* in the box toward or away from the axial center *v*. In Fig. 5 one side of the movable box section forms the diaphragm and in Figs. 6 and 6^a the button *y* and attached slide *t* form the diaphragm.

Another modification, seen in Fig. 7, shows the sound box in triangular or wedge shape. This not only makes the outer end heavier for better centrifugal effect, but also gives a diverging horn-like outlet for the sound, the box being open at its larger end.

As so far described, the sound box revolves and the disk record is relatively stationary. It is obvious that the sound box may, as in Fig. 8, be relatively stationary and the disk rotated by providing it with an eccentric weight *r* and swiveling it on the axial stem, and clamping the sound box in such case rigidly to the handle by nuts *n n*.

In all of these forms the resonant sound box, of violin action, is employed and the sound box is provided with two parts capable of relative progressive movement toward or away from the center in radial direction to permit the proper traverse or progression of the needle in the groove of the disk record, the needle and diaphragm being both supported upon and carried by the sound box, but being slidably adjustable in relation thereto.

What I claim is:

1. In a sound producing device of the kind described, the combination with a disk record member and a manually operable handle with axial stem; of a sound box supported upon said stem and bearing a diaphragm and needle, the sound box being provided with a slidable member carrying said diaphragm and needle.

2. In a sound producing device of the kind described, the combination with a disk record member and a manually operable handle with axial stem; of a sound box supported upon said stem and bearing a diaphragm and needle, the sound box being provided with a slidable member comprising said diaphragm and needle, the slidable member being arranged to form the bottom of the sound box and movable in guideways in the lower edges of the same.

3. In a sound producing device of the kind described, the combination with a disk record member and a manually operable handle with axial stem; of a sound box supported upon said stem and bearing a diaphragm and needle, the sound box being provided with a slidable member comprising said diaphragm and needle, the slidable member being arranged to form the bottom of the sound box and movable in guideways in the lower edges of the same.

4. In a sound producing device of the kind described, the combination with a disk record member and a manually operable handle with axial stem; of a sound box supported upon said stem and bearing a diaphragm and needle, the sound box being provided with a slidable member comprising said diaphragm and needle, the sound box having an opening in its walls to permit the issuance of the sound vibrations.

5. In a sound producing device of the kind described, the combination with a disk record member and a manually operable handle with axial stem; of a sound box bearing a diaphragm and needle, the sound box being provided with a slidable member carrying said diaphragm and needle, and a support attached to the axial stem within the sound box and resting against the lower surface of the upper side of the same to hold the sound box and its needle in proper relation to the subjacent record disk.

6. In a sound producing device of the kind described, the combination with a disk record member and a handle with axial stem; of a sound box bearing a diaphragm and needle, the sound box being provided with a slidable member carrying said diaphragm and needle, and a support attached to the axial stem to sustain the sound box and needle in proper relation to the disk record.

7. In a sound producing device of the kind described, the combination with a disk record member and a sound box; of a central subjacent handle having an upright axial stem passing through the sound box and supporting the same and having a screw threaded lower end adapted to enter the handle, and a projection adapted to clamp the disk record against the handle.

In testimony whereof I affix my signature.

HARRY L. CASSARD.

PHONOGRAPH,

1,178,871-----F.Opferkuck & J.Pfeifer,
Patented-April 11th, 1916.
Filed-August 19th, 1911.

E. OPFERKUCK & J. PFEIFER.

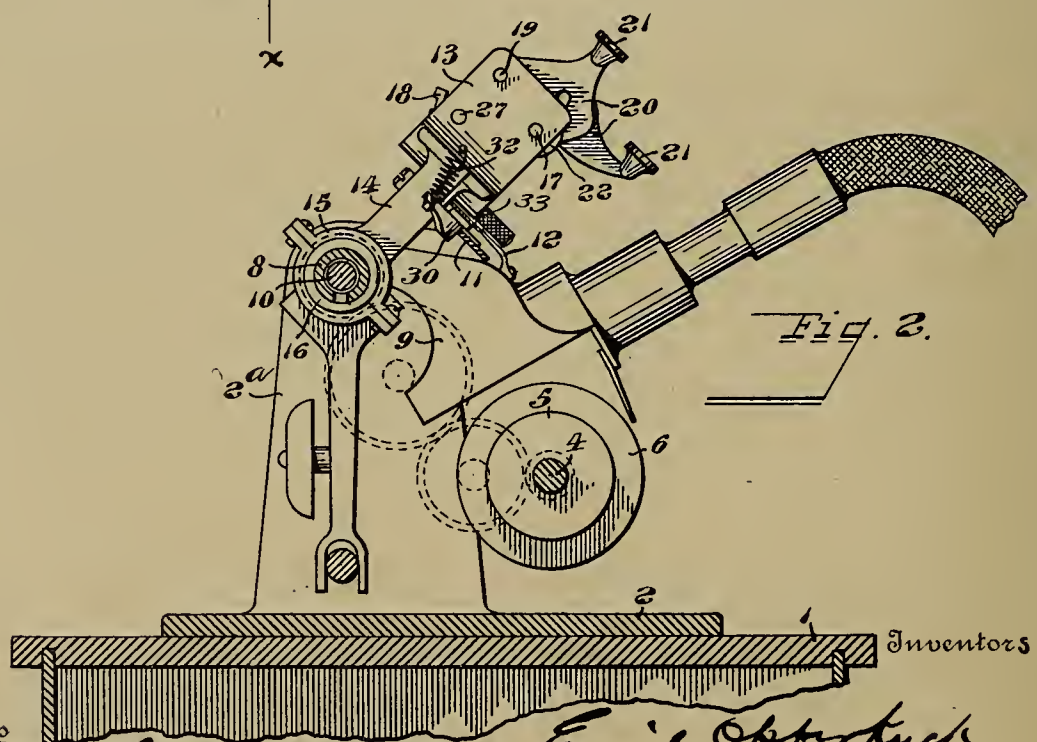
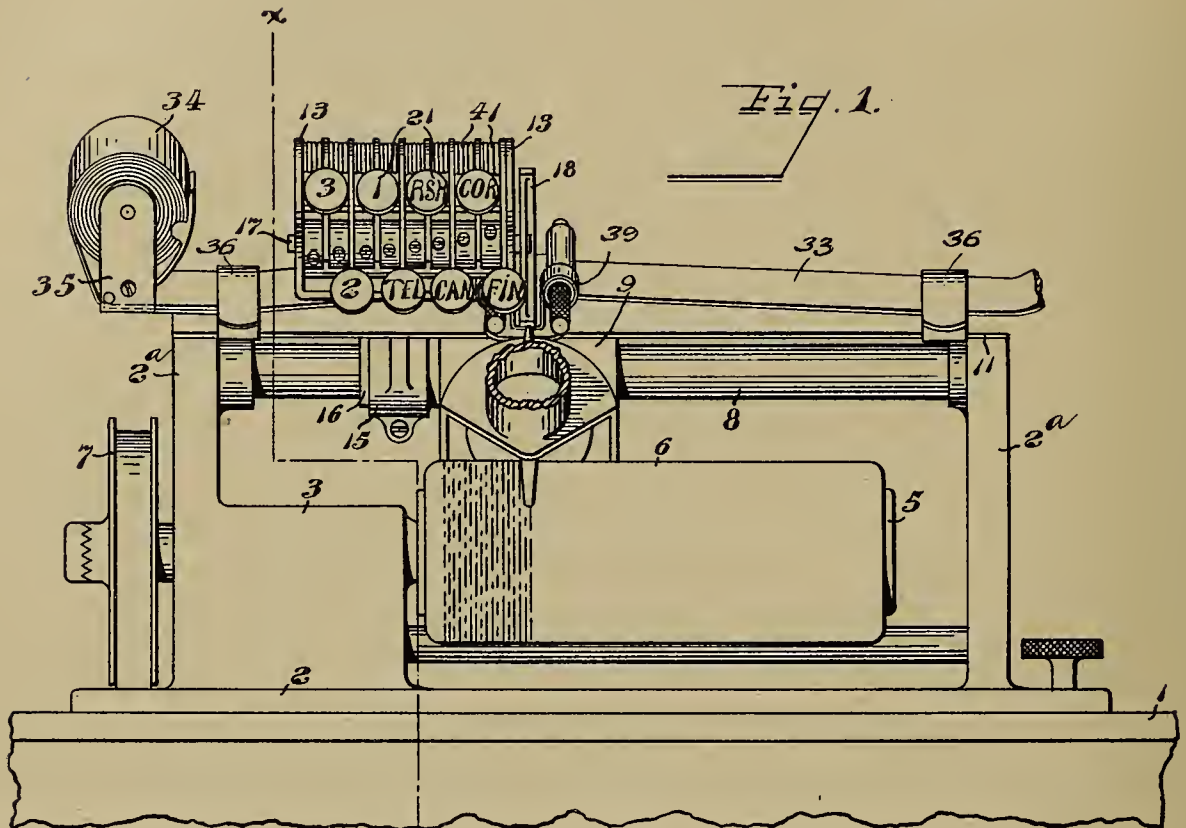
PHONOGRAPH.

APPLICATION FILED AUG. 19, 1911.

1,178,871.

Patented Apr. 11, 1916.

2 SHEETS—SHEET 1.



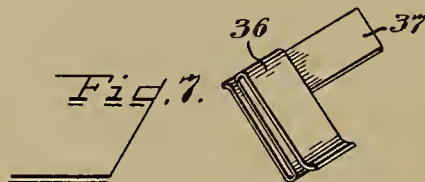
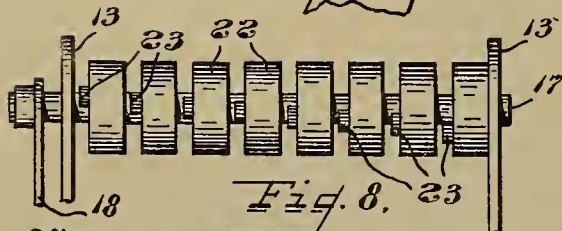
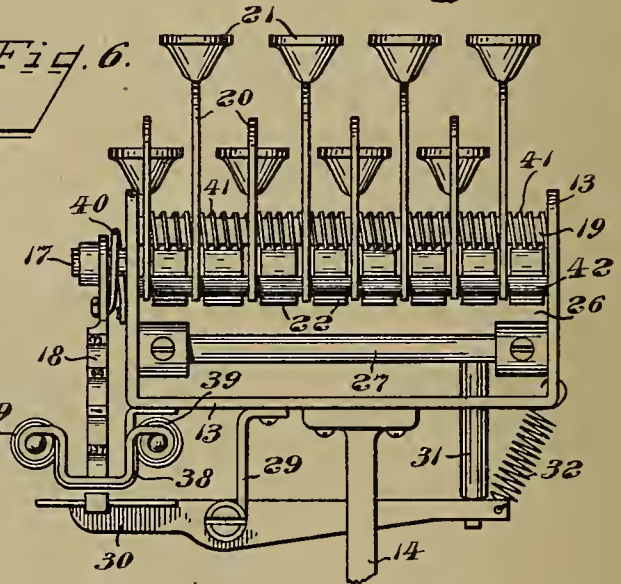
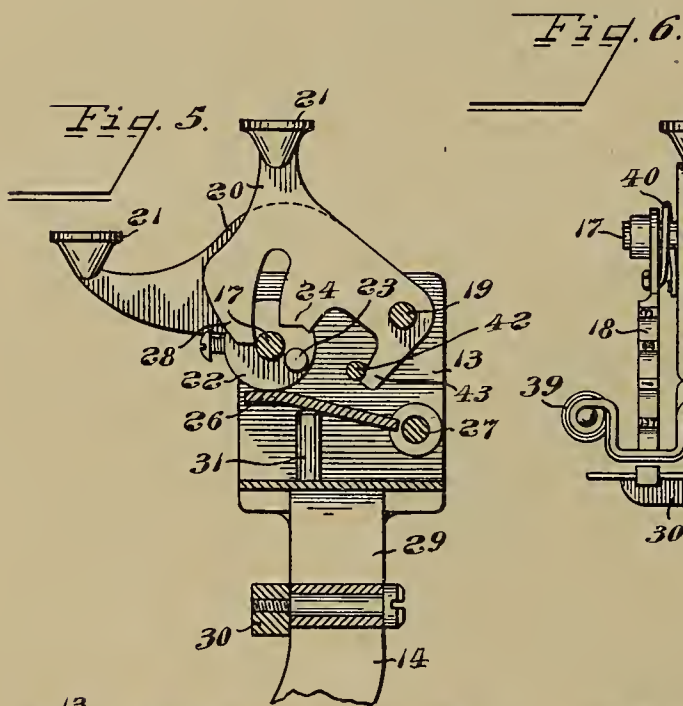
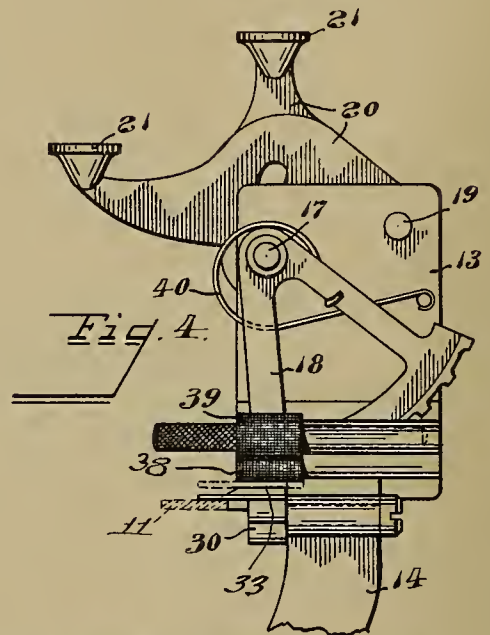
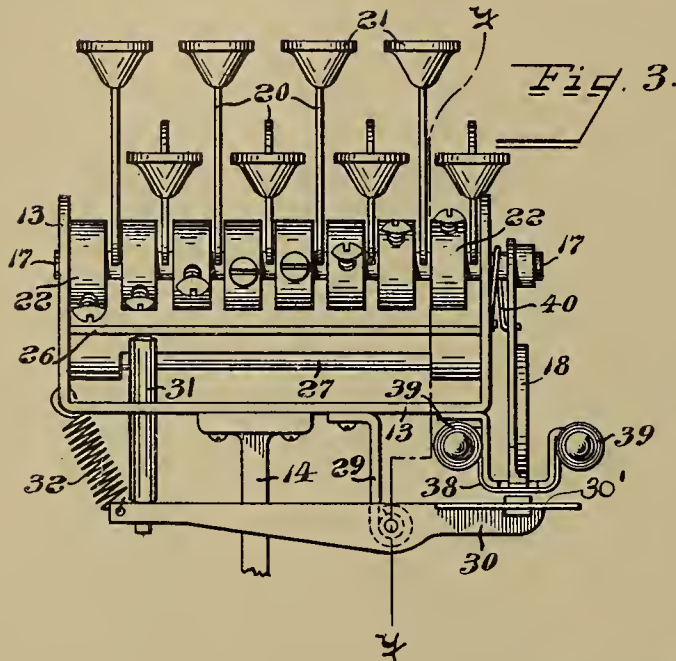
Witnesses
Olivier T. Clarke
Chas. J. Walsh

Inventors
Emil Opferkuck
and John Pfeifer
By *Henry Bowman* Attorney

1,178,871.

Patented Apr. 11, 1916.

2 SHEETS—SHEET 2.



Witnesses
Oliver T. Clarke
Chas. J. Welch

By

Inventors
Emile Opferkuck
and John Pfeifer
Attorneys

UNITED STATES PATENT OFFICE.

EMIL OPFERKUCK AND JOHN PFEIFER, OF SPRINGFIELD, OHIO, ASSIGNORS TO
AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A
CORPORATION OF WEST VIRGINIA.

PHONOGRAPH.

1,178,871.

Specification of Letters Patent. Patented Apr. 11, 1916.

Application filed August 19, 1911. Serial No. 644,984.

To all whom it may concern:

Be it known that we, EMIL OPFERKUCK and JOHN PFEIFER, citizens of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to improvements in phonographs; and particularly to that type of phonograph which is adapted for commercial use in which is employed a recorder for recording dictations and a reproducer for reproducing such dictations. In connection with phonographs of this character it has been usual to employ memorandum sheets, each sheet having printed thereon a scale corresponding to a scale on the phonograph, upon which sheets the dictator may note certain instructions and corrections, this memorandum sheet being turned over to the transcriber as a guide in transcribing the record. In making notations on this memorandum sheet it has been necessary for the dictator to first note the position of the pointer on the scale of the phonograph, locate the corresponding indication on the scale of the memorandum sheet, and then make his notation on such memorandum sheet. In doing this error is liable to occur.

The object of the present invention is to simplify the making of these memorandum instructions and also to obviate all danger of mistake on the part of the dictator by relieving him of the necessity of taking note of the proper indication both on the scale of the phonograph and the scale of the memorandum sheet; also to make more simple and intelligible memoranda for the transcriber.

The invention consists of the construction and combination of parts hereinafter described and set forth in the claims.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which is shown in the accompanying drawings, for the purpose of illustration.

In said drawings: Figure 1 is a front elevation of a phonograph of a well known type with our improvements applied thereto. Fig. 2 is a section on the line $x-x$ of Fig. 1. Fig. 3 is a front elevation of

our improved attachment. Fig. 4 is an end view of the same. Fig. 5 is a section on the line $y-y$ of Fig. 3. Fig. 6 is a rear elevation of the same. Fig. 7 is a detail in perspective of one of the clips for holding the memorandum strip. Fig. 8 is a detail of the type-segment rock shaft, showing the arrangement of its graduated projections.

Like parts are indicated by similar characters of reference in the several views.

In the said drawings, 1 represents a portion of the motor inclosing casing of a phonograph of a well known type, to the upper side of which is secured the metallic base plate 2 upon which are supported some of the working parts of the device, which may be briefly described as follows: Located in the bearing support 3 is a shaft 4 to which is secured the usual mandrel 5 which receives the record tablet 6; the shaft being arranged to be thrown into and out of engagement with a continuously rotating pulley 7 which receives its motion from any suitable source of power. Secured to upwardly extending supports 2^a is a slide rod 8 upon which is slidably mounted in the ordinary way the recorder and reproducer head 9, which in the present instance is of the combined type, and receives its sliding movement on said slide rod from the screw 10 located in said rod in a manner that is well known and need not be described in detail here, this screw being geared to the shaft 4, as shown in dotted lines in Fig. 2, so as to rotate therewith.

In the type of machine illustrated here, it has been usual to employ a scale, which has been attached to some part of the machine, and over which moves a pointer carried by the recorder and reproducer; the scale having suitable indications so that the dictator may indicate on the memorandum sheet the position of the recorder relatively to the record. The present invention provides improved means for accomplishing the same result with superior accuracy, since it eliminates to a very large extent the liability to error.

13 represents a U-shaped frame having a downwardly extending arm 14 terminating in a two-part clamping collar 15 by means of which the frame is attached to the recorder and reproducer carriage. In the particular machine shown in the drawings, the

manner of attachment is by clamping the two-part collar to an extension 16 of the sleeve of the recorder and reproducer carriage which slides on the rod 8.

5 Journalled in the U-shaped frame 13 is a rock-shaft 17, having secured to one end thereof, just outside the frame, a type segment 18, having thereon type representing a series of characters such as "Tel" for telegram, "Rsh" for rush, "Cor" for correction, "Can" for cancel, "Fin" for finish, 10 "1" and "2" for the number of copies required and any other characters which it may be found desirable and necessary to employ to convey proper instructions to the transcriber. Journalled on the shaft 19, also supported in the U-shaped frame, is a series of key-levers 20, one key-lever for each character represented upon the type-seg- 15 ment, the several key-levers having provided respectively thereon characters corresponding to the characters on the type segment 18. Secured to the rock-shaft 17 is a series of collars 22, one for each key-lever. 20 Each of these collars is arranged adjacent its corresponding key-lever and carries a projecting stud 23, lying in the path of a projection 24 on the key-lever. No two of the studs 23 lie in the same horizontal plane, 25 and preferably they are arranged with the highest stud at one end and the lowest stud at the other end, with the intervening studs in gradually decreasing lower planes from the highest to the lowest, as shown in Fig. 8. 30 But it is apparent that the studs may occupy any other desired order of arrangement, it being essential only that the several studs lie in different horizontal planes. The collars 22 are preferably secured to the 35 shaft by set-screws as shown so that they may be accurately adjusted.

40 Located beneath the series of keys is a swinging plate or frame 26, pivoted at its rear end to the cross rod 27, and projecting downwardly from each key-lever is a finger 28, adapted, when the key-lever is depressed, to strike this plate and swing it down- 45 wardly; these fingers 28 being also adapted to act as stops against which the studs 23 strike to prevent overthrow of the type- 50 segment.

Pivoted to a downwardly-extending portion 29 of the main frame is a platen bar 30 having loosely inserted in an aperture at 55 one end thereof an upwardly-extending rod 31 which normally lies just beneath the swinging plate 26 so that when said plate is depressed it will depress one end of the platen bar 30 and force the opposite end 60 carrying the platen 30' upwardly to cause an impression to be made upon the memorandum slip; the platen 30' and plate 26 being returned to their normal positions by the spring 32, and the type-segment to its 65 normal position by the spring 40. Coil

70 springs 41 are also provided for the key-levers to return said levers to normal position, said springs being arranged on the rod 19, with one of their ends bearing against the under sides of the key-levers, and the other end attached to the cross-rod 42. This rod 42 also acts as a stop for the levers which are provided with tails 43 which strike the rod and limit the upward 75 movement of said levers under the tension of the springs.

The characters are printed on a slip of paper 33 which is unwound from the roll 34 journalled in the supports 35; said strip extending across the machine just above the support 11 and under the type segment 18; 80 an inked ribbon 38, on roll 39 being fed between the type segment and paper strip in any well known manner; said paper strip is held in position by the spring clips 36. These clips are S-shaped as shown in Fig. 7, 85 and are slipped over the supporting strip 11 at the respective ends thereof. After the record has been completed the paper strip 33 is drawn outwardly and torn off on the knife edge projection 37 which projects from one of the clips. The torn-off slip is then 90 placed in the transcriber's machine which is provided with similar clips 36 to receive the same, care being exercised of course to have the paper strip occupy the same position 95 relatively to the record roll as it did in the dictator's machine. Of course, if the same machine is used both for dictating and transcribing, it would be unnecessary to remove the memorandum strip until the record has been transcribed. It will be understood that the transcriber simply moves the reproducer head until the pointer 100 points to the character on the printed strip to locate the desired place on the record. 105

Having thus described our invention, we claim:

1. In a phonograph, a recorder; a record receiver; a printing device in fixed relation 110 with said recorder, said printing device comprising a type carrying member, carrying a series of type characters representing different instructions, a series of keys for operating said type carrying member, a paper strip, and means whereby the operation 115 of any one of said keys causes the character to be printed on said strip corresponding to the key operated.

2. In a phonograph, a traveling recorder 120 and reproducer, a revoluble record receiver over which said recorder and reproducer travels, a pointer on said recorder and reproducer, a paper strip over which said pointer travels, and a series of printing de- 125 vices in fixed relation with said recorder and reproducer, said printing devices comprising a series of keys and a type carrying member together with devices operated by said keys for causing an impression to be 130

printed on said paper strip corresponding to the key operated.

3. In a phonograph, a recorder, a record receiver, and a memorandum-receiving strip
5 arranged on said phonograph; in combination with a printing mechanism, said printing mechanism comprising a swinging type-carrying member, a rock-shaft to which said member is operatively connected, a series of
10 key-levers, projections on said shaft arranged at varying distances around the same, a projection on each of said key-levers corresponding to said shaft projections and adapted to contact the same to rock said
15 shaft a distance corresponding to the key operated, a pivoted platen, a swinging plate under said key-levers having an operative connection with said platen, and a finger on each of said key-levers to swing said plate
20 upon the depression of its key, said fingers, in the depressed positions of said keys, being adapted to lie in the path of said shaft projections to prevent overthrow of said type member.

25 4. In a phonograph, a sound recorder, a sound record receiver, a memorandum-receiving member, and a printing mechanism; said printing mechanism comprising a type-carrying member and a series of keys, a

rock-shaft to which said type carrying
member is connected, a platen coöperating
30 with said type-carrying member, graduated projections on said shaft, means on said keys coöperating with said projections to rock said shaft varying distances; a swing-
35 ing frame under said keys operatively connected with said platen, and fingers on said keys for operating said frame and also adapted to coöperate with said shaft projections to prevent overthrow of said type-
40 carrying member.

5. In a talking machine, a rotatable record carrier and a traveling sound box carriage in combination with a stationary
45 memorandum-sheet holder, a supporting bracket on said carriage, printing instrumentalities connected with said bracket and moved by the carriage in juxtaposition to the memorandum-sheet holder, and manually operated means on said bracket to op-
50 erate said printing instrumentalities.

In testimony whereof, we have hereunto set our hands this 15th day of August 1911.

EMIL OPFERKUCK.

JOHN PFEIFER.

Witnesses:

CHAS. I. WELCH,

OLIVER T. CLARKE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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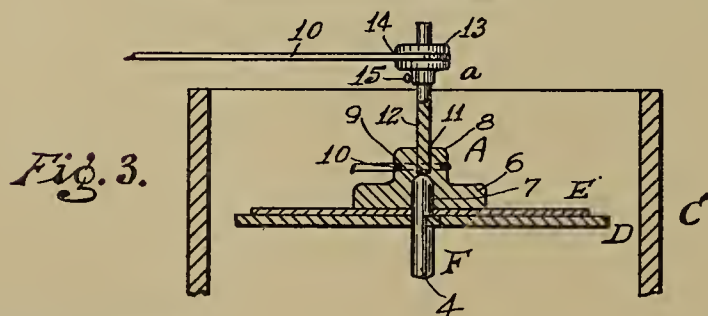
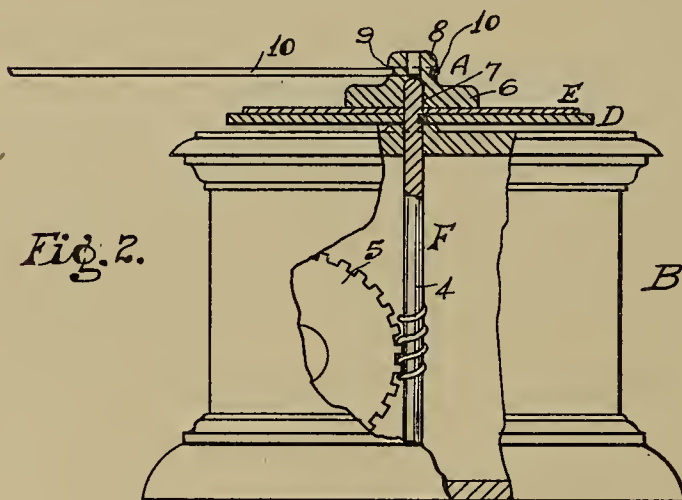
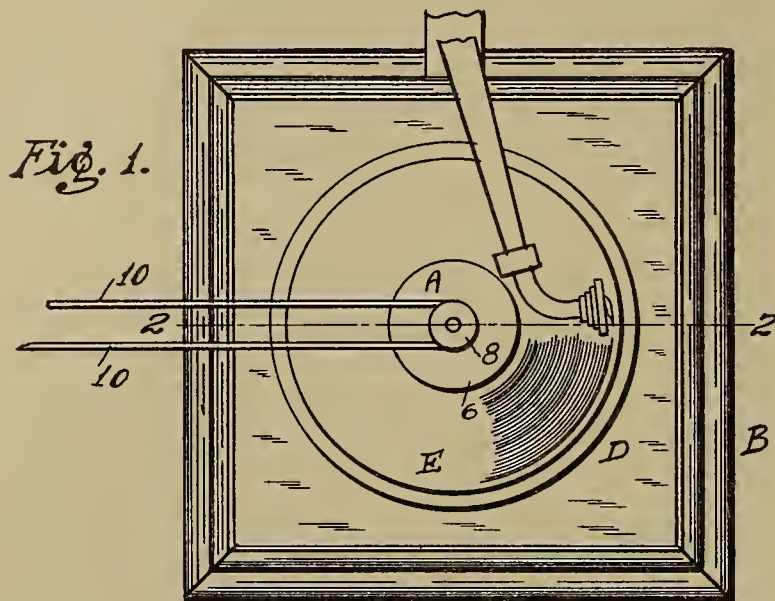
MEANS FOR OPERATING A PICTURE DISPLAYING
APPARATUS FROM A SOUND-PRODUCING APPARATUS.

1,179,591-----R. A. Whitehead,
Patented-April 18th, 1916.
Filed-March 13th, 1912.

R. A. WHITEHEAD.
 MEANS FOR OPERATING A PICTURE DISPLAYING APPARATUS FROM A SOUND PRODUCING APPARATUS.
 APPLICATION FILED MAR. 13, 1912.

1,179,591.

Patented Apr. 18, 1916.



Witnesses:
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 H. M. Fulmer.

Inventor:
 Richard A. Whitehead;
 By Raymond H. Blakelee,
 his Attorney.

UNITED STATES PATENT OFFICE.

RICHARD A. WHITEHEAD, OF LOS ANGELES, CALIFORNIA.

MEANS FOR OPERATING A PICTURE-DISPLAYING APPARATUS FROM A SOUND-PRODUCING APPARATUS.

1,179,591.

Specification of Letters Patent.

Patented Apr. 18, 1916.

Application filed March 13, 1912. Serial No. 683,537.

To all whom it may concern:

Be it known that I, RICHARD A. WHITEHEAD, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Means for Operating a Picture-Displaying Apparatus from a Sound-Producing Apparatus, of which the following is a specification.

The present invention relates to means for operating picture displaying apparatus or the like simultaneously with a sound producing apparatus, such as a phonograph, the object of the invention being to provide a device of this character which embodies novel features of construction whereby pictures can be displayed simultaneously with the renditions of music and monologues by the phonograph.

Further objects of the invention are to provide a device of this character which is simple and inexpensive in its construction, which can be quickly placed in operative position or removed therefrom, and which will not in any manner injure the phonograph or interfere with the proper operation thereof.

With the above and other objects in view, the invention consists in the novel and useful provision, formation, combination, association and relative arrangement of parts, members and features, all as hereinafter described, shown in the drawing, and finally pointed out in claims.

In the drawing:—Figure 1 is a partial top plan view of a phonographic apparatus or mechanism showing the invention applied thereto; Fig. 2 is a side elevation of the same, partly in section upon the line 2—2, Fig. 1, and partly broken away for fullness of illustration; and, Fig. 3 is a fragmentary sectional elevation, partly in full elevation, of a modified form of construction or combination of parts and features.

Corresponding parts in all the figures are denoted by the same reference characters.

Referring with particularity to the drawing, A designates the improved operating means for stereopticons and the like embodying the invention, *a* in Fig. 3 design-

ating an added member thereon for use under certain working conditions and in certain environment.

B designates the casing of a phonograph or like sound producing apparatus, in Figs. 1 and 2, C in Fig. 3 designating a phonographic apparatus casing of a modified formation.

In all of the figures, D designates the rotating sound record disk table, E designates the sound record which is disposed thereon, in the performance of a production rendered by the phonograph, and F designates actuating means for the table D to cause the rotation thereof, said actuating means comprising a spindle 4 rising through the top of the casing B and upon which the table D is fixed to rotate, and a suitable motor or motor element 5 to cause the rotation of the spindle 4, all as per standard or preferred practice.

The operating means A comprises a body 6, preferably circular in form and of such diameter to fit within the confines of the blank center of the record disk E, such body being provided with a central recess 7 fitting over the upper end of the spindle 4 which projects centrally through and above the record disk E in the customary manner. The body 6 is preferably of metal and of considerable mass or weight whereby it frictionally engages with the center of a rotatable disk element such as the record E so as to be sufficiently bound thereto to rotate in unison with the record. Centrally of the body 6 rises a circular crown 8 having a peripheral groove 9 within which fits and which accommodates a cord or belt 10 by which the rotatable motion of the disk record and of the body 6 and its fixed crown 8 is imparted to the stereopticon or similar picture-displaying apparatus, which is not shown, as the invention in no way pertains to its construction and organization. In the modified form of construction shown in Fig. 3, the crown 8 is provided with a central vertical squared socket 11 receiving the squared lower end of a stem 12 which detachably fits said socket 11 and carries at its upper end an adjustable circular crown 13 having a peripheral groove 14 and provided with a thumb screw 15

whereby it may be set in position of adjustment upon the stem. Within the groove 14 fits the cord or belt 10.

It will be noted that the casing B in Figs. 1 and 2 terminates beneath the plane of the table D, whereas the casing shown in Fig. 3 extends above the plane of such table and considerably above the plane of the record disk E as well as above the plane of the crown 8 of the body 6 of the operating means A.

In certain types of phonographs and the like the relative arrangement and dimensions of parts and features shown in Fig. 3 are approximated, requiring of course means for vertically extending the operating means A, so that the belt or cord 10 may clear the casing in the extension of such belt or cord to the stereopticon or the like. Such means of vertical extension is provided by the supplemental member *a* shown in Fig. 3. The body 6 and crown 8 may be employed equally effectively with or without said member *a* comprising the stem 12 and crown 13, the rotatable movement of the body 6 being imparted in one instance through the crown 8, and in the other instance through the crown 8 and the crown 13, to the belt or cord 10, and thereby imparted to the stereopticon or like apparatus to cause the actuation of the same simultaneously with the actuation of the phonograph or like apparatus, the rendition produced by which being thus illustrated, as predetermined, by the pictures produced by the stereopticon or like apparatus or mechanism. The body 6 may frictionally, by tight fit, grip the top of the spindle 4 in the recess 7, thus binding the body to the spindle for rotation therewith and with the record disk and table, or the body may fit loosely over the top of the spindle and rely solely upon its frictional grip upon the central portion of the disk to cause rotation of the body with the disk and table.

The operating means A are extremely simple and inexpensive in organization, convenient to apply and detach, and are too simple to get out of order and are extremely durable and positive in operation. The same may be used for either style of casing B or C, either without or with the member *a*, as the case may be, such member being installed in or removed from working position by simply slipping its squared end into the correspondingly formed socket 11 or withdrawing it therefrom.

It is manifest that the operating means A may be employed to transmit the motion of a revolving disk element such as the table D of the sound producing apparatus to picture-producing apparatus or any other apparatus capable of actuation under the power produced by rotation of the table D, with or without the record disk E, being interposed

between the means A and the table D, as the body 6 may rest directly upon the table D, the recess 7 being formed of proper length to that end.

Having thus described my invention, I claim and desire to secure by Letters Patent:—

1. Means for operating picture-displaying apparatus or the like simultaneously with sound producing apparatus, the latter having a rotatable disk element, comprising a body formed to frictionally rest upon and rotate with the disk element, and motion transmitting means extending between said body and said picture-displaying apparatus or the like.

2. Means for operating picture-displaying apparatus or the like simultaneously with sound producing apparatus, said sound producing apparatus having a rotatable disk element and a spindle for rotating the same, said spindle projecting above said disk element centrally thereof; comprising a body formed to fit over the upper end of said spindle and to frictionally engage with said disk element, and motion transmission means between said body and said picture-displaying apparatus or the like.

3. Means for operating picture-displaying apparatus or the like simultaneously with sound producing apparatus, said sound producing apparatus having a rotatable record disk and a spindle for rotating the same, said spindle projecting above said record disk centrally thereof; comprising a body formed to fit over the upper end of said spindle and adapted to frictionally engage with said record disk thereon within the inner confines of the record, and motion transmission means between said body and said picture-displaying apparatus or the like.

4. Means for operating picture-displaying apparatus or the like simultaneously with sound producing apparatus, said sound producing apparatus having a rotatable disk element and a spindle for rotating the same, said spindle projecting above said table centrally thereof; comprising a body formed to fit over the upper end of said spindle and to operatively engage with said disk element to rotate therewith; said body being provided with an axially disposed crown portion, and a motion transmission belt operatively engaging said crown portion.

5. Means for operating picture-displaying apparatus or the like simultaneously with sound producing apparatus, said sound producing apparatus having a rotatable disk element and a spindle for rotating the same, said spindle projecting above said disk element centrally thereof; comprising a body formed to fit over the upper end of said spindle and to frictionally engage with

said rotatable disk element; said body being provided with a crown having a belt receiving groove formed therein, and a motion transmission belt engaging the crown and received within the before mentioned groove thereof.

6. Means for operating picture-displaying apparatus or the like simultaneously with sound producing apparatus, said sound producing apparatus having a rotatable disk element and a spindle for rotating the same, said spindle projecting above said rotatable disk element centrally thereof; comprising a body formed to fit the upper end of said spindle and to frictionally en-

gage with said rotatable disk element, said body having a socketed portion, an upwardly projecting shaft fitting said socketed portion and arranged in alinement with the before mentioned spindle of the sound producing apparatus, a pulley upon the said shaft, and a motion transmission belt engaging the pulley.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

RICHARD A. WHITEHEAD.

Witnesses:

RAYMOND I. BLAKESLEE,

CHARLES D. WARDEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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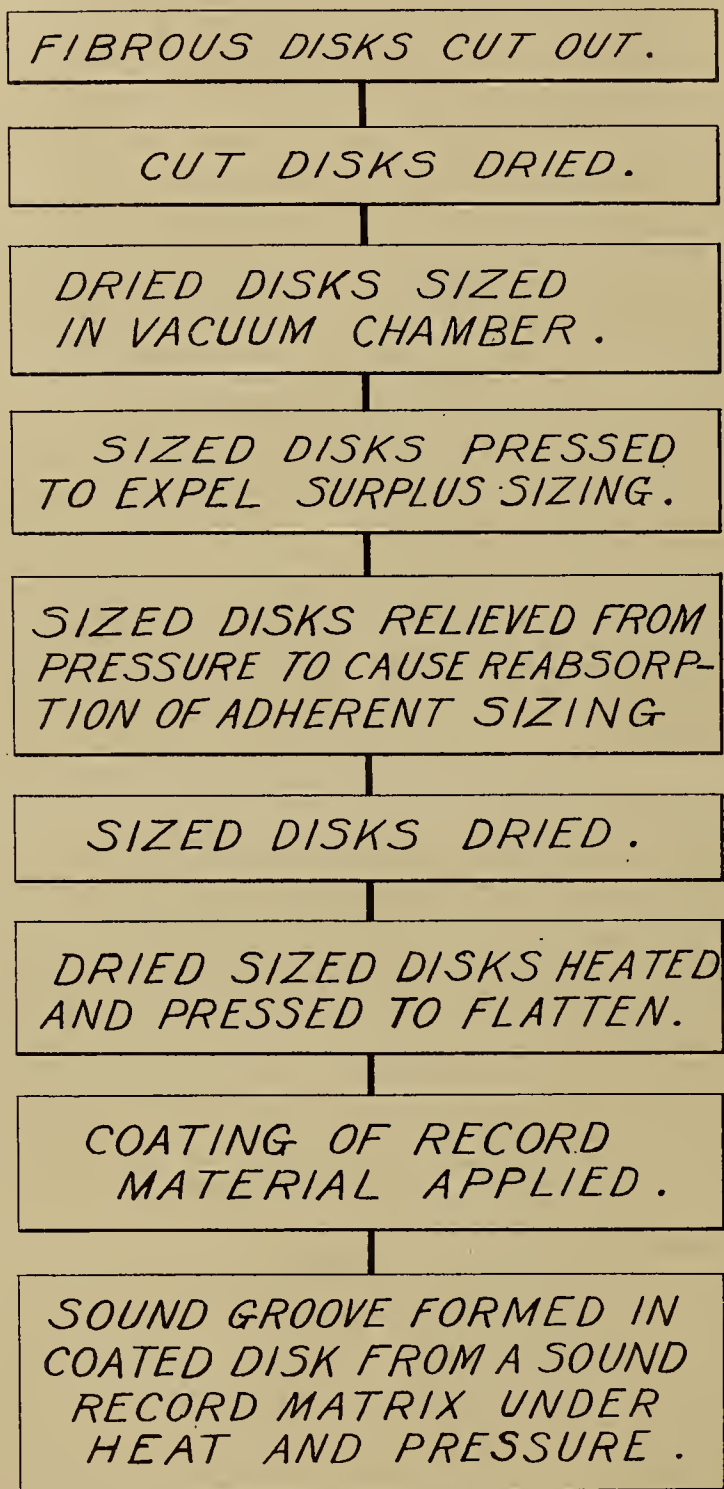
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#1179. 660-J. Sanchez.

J. SANDERS.
MANUFACTURING SOUND RECORD TABLETS.
APPLICATION FILED FEB. 6, 1909.

1,179,660.

Patented Apr. 18, 1916.



Witnesses

E. J. Chapman
F. J. Chapman.

^{Inventor}
Joseph Sanders.

By *C. A. Snow & Co.*
^{Attorneys}

UNITED STATES PATENT OFFICE.

JOSEPH SANDERS, OF WASHINGTON, DISTRICT OF COLUMBIA.

MANUFACTURING SOUND-RECORD TABLETS.

1,179,660.

Specification of Letters Patent.

Patented Apr. 18, 1916.

Application filed February 6, 1909. Serial No. 476,419.

To all whom it may concern:

Be it known that I, JOSEPH SANDERS, a citizen of the United States, residing at 770 Girard street, in the city of Washington and District of Columbia, have invented a new and useful Improvement in Manufacturing Sound-Record Tablets, of which the following is a specification.

This invention has reference to improvements in the manufacture of sound record tablets and more particularly in the manufacture of sound record tablets of the type disclosed in my application No. 204,024, filed April 20, 1904, for improvements in sound record tablets.

In the type of tablet disclosed in the said application there is provided a basic disk of cardboard, or strawboard, or pulpboard, or other such fibrous material and this basic disk is sized with a material capable of softening under heat and then yielding to pressure, but which is quite hard and resistant when cold, that is at normal temperatures, and which furthermore cements the fibers of the disk together so that, when the base has been coated with a suitable record material and a sound record matrix is pressed against the same while both the coating and the disk are heated so that the coating and sizing have become appropriately softened and the basic disk has become more or less condensed by the pressure used, the sizing will hold the compressed base in the condensed condition after the sizing has become hardened by the chilling of the tablet before the pressure is relieved.

The present invention relates more particularly to the manufacture of the basic disks upon which the coating of record material is either directly applied as in the aforesaid application or is first applied to a thin carrier such as a sheet of paper and then the coated sheet is applied to the fibrous, sized base as set forth in my application No. 239,961, filed January 6, 1905, for gramophone record tablets.

In accordance with the present invention disks of the proper size, agreeable to the sizes of commercial forms of sound record tablets, are first cut or punched from pulpboard, or strawboard, or cardboard, or any other of the materials suitable for the purpose but which for convenience of description will be considered as included in the generic term cardboard. Of course the disks may be molded into shape from suitable

stock and thus the waste due to cutting or punching from sheets of the material is avoided. Since the cardboard disks are liable to or do actually contain some moisture they are now dried in order to expel any moisture which they may contain. The disks are now ready for treatment with a suitable sizing which sizing should, for the purposes of the invention, be sufficiently adherent to the fibers making up the cardboard disk to cement these fibers together even against considerable force tending to separate the fibers. Furthermore the sizing should be characterized by being comparatively hard and resistant at ordinary temperature so as not to yield under the handling to which record tablets are ordinarily subjected, but which will soften, under a degree of heat low enough not to injure the material entering into the composition of the record receiving surface, to a sufficient degree to yield under the pressure to which the tablet is subjected in the operation of pressing a record groove into the record receiving surface from a matrix of the sound record.

There are various compositions suitable for the sizing, such for instance as those named in the aforesaid applications for Letters Patent, but I have found Manila gum to be a most excellent substance for the purpose, and since the gum is applied in accordance with the present invention when dissolved in a suitable solvent, I have obtained very satisfactory results when the gum is dissolved in wood alcohol and benzol in the proportion of eighty pounds of Manila gum to forty-six pints of wood alcohol and fifty pints of benzol, it being understood however, that these proportions may be varied without disadvantage. Since the materials used as bought in the open market are not always free from dirt, it is advisable to filter the solution.

In order to apply the solution of sizing to the disks they are placed in a vacuum chamber preferably in baskets suitably shaped to support the disks on edge and present practically the entire exterior of the disks to the action of the sizing solution. The air is extracted from the chamber in which the disks are placed, this chamber of course being capable of being sealed against the entrance of air and as the air is extracted from the chamber such air as may be imprisoned within the disks is also extracted. The sizing so-

lution is now allowed to flow into the vacuum chamber to a depth sufficient to immerse completely the cardboard disks within said chamber and under these conditions the sizing penetrates the innermost interstices of the disks thus thoroughly infiltrating them, even to the intercellular structure. The vacuum chamber is now opened and the impregnated disks are removed, the baskets or supports for the disks having maintained them separated one from the other so that the infiltration was thorough and expeditious. The infiltrated disks are now stacked with or without separators but preferably without separators, and are placed in a press and subjected to pressure, say from thirty-five to forty tons total for disks which are about ten inches in diameter. This causes the surplus sizing to be squeezed out and such surplus sizing may be caught in a suitable receptacle and returned to the reservoir of the sizing solution or may be allowed to flow spontaneously to the reservoir through a suitable conduit. Of course the expressing of the surplus sizing solution may be accomplished either by a press as the term is ordinarily understood or the disks may be passed through pressing rolls which may be properly spaced and adjusted for the same purpose.

When the pressure is relieved each disk will return toward its normal thickness, having been reduced in thickness by the applied pressure. This will cause the re-absorption of any of the sizing which remains on the surface or edges of the disks and does not flow away therefrom so that the surface becomes relatively dry and thus permits easy handling of the sized disks even though a large portion of the solvent is still retained in the disks and the sizing is still in a sticky or tacky condition.

By regulating the pressure to the fluidity of the sizing solution or by suiting the amount of solvent employed to the pressure used, the amount of sizing in the disks after the surplus has been removed may be fixed to a nicety. The amount of sizing used should be such that after the final compression of the tablet under the pressure used for impressing the sound record groove into the tablet from a matrix thereof there will be neither material surplus nor lack of sizing in the basic disks. The proportions of the ingredients of the sizing solution and the pressures employed as hereinbefore given are those used in actual practice and are very close to if not actually the exact proportions of ingredients for the sizing solution, and very close to the pressures needed for the best results with pulpboard disks.

After the disks have been infiltrated with the sizing solution and the surplus removed in the manner described the disks are dried.

Since air drying would be very slow the disks are dried in an oven or in a vacuum chamber and if so desired the solvent used in the sizing solution may be recovered in the usual manner.

The dried disks with the sizing therein are liable to be more or less distorted from a true flat shape and sometimes these disks contain hard spots incorporated in the material from which the disks are cut or punched, during the manufacture of such material. In order to flatten out the disks, and also to flatten the hard spots, the disks are again heated to a sufficient degree to soften the sizing and are then subjected to a moderate pressure, say from five to ten tons total for a ten inch disk. For this step separators may or may not be used. Separators are not always necessary even when hard spots are present or suspected, but may be used, if needed, to flatten out hard spots in some kinds of cardboard. The separators, when used either in the step just named or when the disks are first subjected to pressure, may be metal disks of suitable diameter and suitable thickness, sheet metal being thick enough for the purpose. The disks having been cooled under the pressure used in the last described step remain flat and of even thickness indefinitely. The disks may now, if desirable or necessary, have the edges rounded off or smoothed in a lathe and are ready to receive the surface coating of any desired suitable record receiving material in any suitable manner. The methods set forth in my aforesaid application for Letters Patent No. 204,024, or in the aforesaid application No. 239,961, or in my application No. 410,456, filed January 11, 1908, for sound record tablets and method of manufacturing the same, with the materials specified in said several applications, will give most excellent results.

As a specific instance of a surfacing material adapted for the reception and reproduction of a sound record of the gramophone type, there may be prepared a mixture of shellac and natural oxid of iron in about the proportions set forth in my Letters Patent No. 787,001, granted April 11, 1905, for a composition of matter for sound record tablets. The shellac may be incorporated with the powdered oxid of iron on hot mixing rolls and after cooling the material may be powdered. Then by coating the disk with a thin solution of shellac or with what may be termed an emulsion of the material just described made by dissolving the shellac in a solvent, while the oxid of iron remains in suspension in the solution, the powdered record material may be deposited in a thin layer on the still wet coating which then acts to cement the powdered material to the basic disk. This method of applying the record receiving material to the basic disk

and also the specific material mentioned is to be taken as illustrative only since various other materials and other methods of applying the materials to the basic disk may be employed. It may be stated however, that the particular material mentioned and the method of application thereof gives very satisfactory results.

The method of producing a sound record groove from a matrix of an original sound record in a tablet having a surface coating of record receiving material on a basic disk sized with a material which softens under heat consists in heating such tablet until the surface coating and the sizing have become sufficiently softened and then applying pressure with the matrix against the face of the tablet thus impressing the matrix into the softened facing layer. The fibrous portion of the base or under-structure being incompletely filled with the sizing, will condense under the action of the pressure until the interstices of the fibrous base are substantially filled with the sizing, or at least so filled that when the tablet has cooled to the normal atmospheric temperature, which is usually accomplished by chilling the mold in which the matrix and tablet are placed for compression, the fibers making up the fibrous base are all cemented together by the sizing.

The finished tablet with the sound record groove impressed is indistinguishable in appearance from a record tablet made wholly from record material, but the tablet with the fibrous base or under-structure is materially lighter than the solid record tablet and far more resistant to breakage. Moreover, the base or understructure or core of the finished tablet has substantially the same coefficients of bending and expansion as the surface coating of gramophone record material, wherefore cracking of the surface material and warping of the tablets is avoided. The base or core is also resonant, so that there is no deadening of the sound in reproduction thereof from the complete sound record tablet. The operation of pressing the matrix into the record surface and the resultant tablet is not materially different from the method of procedure and the result obtained when the record receiving material is first applied to a paper carrier and the paper carrier so coated is then applied to the basic sized disk.

In the accompanying drawing forming a part of this specification there is shown a diagram in which the various steps already described are briefly set forth in order, and since these steps have all been hereinbefore fully set forth the description need not be repeated with special reference to the schematic representation of the drawing.

Instead, however, of applying the sizing in solution to the base, or in addition to the

use of a solvent, the sizing may be brought to a flowing condition by heat. The fibrous disks are then immersed in the hot sizing and are afterward pressed while the sizing is still hot enough to flow, or after reheating if desired, to expel the surplus sizing and to cause the reabsorption of adherent sizing, after which the disks are cooled either spontaneously or by being chilled. When the disks are sized by a sizing brought to a flowing condition by heat, they are not dried after the reabsorption of the adherent sizing, but are merely cooled, and distortions due to the evaporation or expelling of a solvent are avoided.

What is claimed is:—

1. The method of producing basic disks or understructures for sound records, consisting in infiltrating a fibrous base with a solution of a normally hard sizing and subjecting the infiltrated base to such heavy pressure as to discharge surplus sizing solution and on relief of the pressure cause such reabsorption of the solution as to render the surface of the base dry enough for handling.

2. The method of producing basic disks or understructures for sound records, consisting in infiltrating a fibrous base with a solution of a thermoplastic sizing and subjecting the infiltrated base to such heavy pressure as to discharge surplus sizing solution and on relief of the pressure cause such reabsorption of the solution still on the surface of the fibrous base as to render said surface dry enough for handling.

3. The method of producing basic disks or understructures for sound record tablets, consisting in subjecting a fibrous base to subatmospheric pressure and infiltrating it with a solution of a thermoplastic sizing and then subjecting the infiltrated base to such heavy pressure as to discharge surplus sizing solution and on the relief of the pressure cause the reabsorption of sizing solution on the surface of the infiltrated fibrous base to an extent to thereby render the surface of the base dry enough for handling.

4. The method of producing basic disks or understructures for sound record tablets, consisting in infiltrating a fibrous disk with a solution of normally hard sizing capable of softening under heat and before the solvent has evaporated subjecting the disk to heavy pressure simultaneously applied to substantially the whole area of the disk and then relieving the pressure and thereby causing reabsorption of sizing solution still on the surface of the disk to an extent to render the surface of the disk dry enough for handling.

5. The method of producing basic disks or understructures for sound record tablets consisting in infiltrating a fibrous disk with a solution of a resinous sizing in a

volatile solvent, then subjecting the infiltrated disk to heavy pressure simultaneously applied over substantially the whole area of the disk to discharge surplus sizing solution, then relieving the pressure to thereby cause reabsorption of sizing solution still on the surface of the disk to an extent to render the surface dry enough for handling and then subjecting the disk to heat to evaporate the solvent.

6. The method of producing basic disks or understructures for sound record tablets, which consists in extracting the air from the immediate neighborhood of a base, then infiltrating the base with a sizing in solution, then subjecting the infiltrated base to heavy pressure to force out a portion of the absorbed sizing solution, and then relieving the pressure and thereby causing the base to re-absorb substantially all the sizing solution then on the surface thereof.

7. The method of producing basic disks or understructures for sound record tablets, which consists in extracting the air from the immediate neighborhood of a base, then infiltrating the base with a thermoplastic sizing in solution, then subjecting the infiltrated base to heavy pressure to force out a portion of the absorbed sizing solution, and then relieving the pressure and thereby causing the base to re-absorb substantially all of the sizing solution then on the surface thereof.

8. The method of producing basic disks or understructures for sound record tablets, which consists in first drying a base, then extracting the air from the immediate neighborhood of the base, then infiltrating the base with a thermoplastic sizing in solution, then subjecting the infiltrated base to heavy pressure to force out a portion of the absorbed sizing in solution, and then relieving the pressure and thereby causing the base to re-absorb any sizing solution on the surface thereof to render such surface dry enough to handle.

9. The method of producing basic disks or understructures for sound record tablets, which consist in extracting the air from the immediate neighborhood of a base, then infiltrating the base with a thermoplastic sizing in solution, then subjecting the infiltrated base to heavy pressure to force out a portion of the absorbed sizing solution, then relieving the pressure and thereby causing the base to re-absorb the sizing solution on the surface thereof to an extent to render the surface dry enough to handle, and then causing the evaporation of the solvent and the consequent solidification of the sizing.

10. The method of producing basic disks or understructures for sound record tablets, which consists in infiltrating a fibrous disk with thermoplastic sizing, then soft-

tening the sizing by heat, and then straightening or flattening the disk by pressure while the sizing is plastic and maintaining the pressure until the sizing has solidified by cooling.

11. The method of producing basic disks or understructures for sound record tablets, which consists in infiltrating a fibrous disk with thermoplastic sizing, then softening the sizing by heat, and then straightening or flattening the disk by pressure against surfaces unyielding to the pressure used while the sizing is plastic, and maintaining the pressure until the sizing has solidified by cooling.

12. The method of producing basic disks or understructures for sound record tablets, which consists in infiltrating a fibrous base with a solution of a thermoplastic sizing in a vacuum chamber, then subjecting the infiltrated base to pressure to force out a portion of the absorbed sizing solution, then relieving the base from pressure to cause the re-absorption of sizing clinging to the surface of the base, then causing the removal of the sizing solvent from the base, then heating the base to soften the sizing, and then subjecting the heated base with the softened sizing to pressure.

13. The method of producing tablets for the reception of sound record impressions from matrices of the same, which consists in infiltrating a fibrous base with thermoplastic sizing, then softening the sizing by heat, then straightening or flattening the base while the sizing is plastic by pressure applied to said base and maintaining the pressure until the sizing has solidified by cooling, and then applying a surface coating of suitable sound record material.

14. The method of producing tablets for the reception of sound record grooves from a matrix of the same under the action of heat and pressure, which consists in infiltrating a fibrous disk with thermoplastic sizing, then softening the sizing by heat, then straightening out or flattening the disk by pressure applied while the sizing is plastic and with the disk against surfaces unyielding to the pressure used, and maintaining the pressure until the sizing has solidified by cooling, and then applying a thermoplastic sound record material to the surface of the tablet.

15. The method of producing sound record tablets which consists in infiltrating a fibrous disk with thermoplastic sizing, then softening the sizing by heat, then while the sizing is plastic pressing the disk against surfaces unyielding to the pressure used and maintaining the pressure until the sizing has solidified by cooling, then coating the sized disk with thermoplastic record material, and finally impressing a sound record groove into the record material from a ma-

trix of a sound record while the tablet is softened by heat.

16. The method of producing sound record tablets which consists in first producing
5 disks of fibrous material, then infiltrating the disks with a solution of a thermoplastic sizing, then subjecting the infiltrated disks to pressure to force out a portion of the sizing solution, then relieving the pressure and permitting the disks to swell to re-absorb sizing solution clinging to the surface of the disks, then causing the solidification of the sizing in the disk by the evaporation of the solvent thereof, then
10 heating the sized disks, then flattening the disks by pressure while the sizing is softened by heat, then coating the disk with a suitable record material, and finally producing a sound record groove in the record receiving surface from a matrix of such sound record under the action of heat and pressure.

17. A step in the method of preparing sound record tablets, which consists in subjecting fibrous basic disks containing thermoplastic sizing to the action of heat and pressure before the application of the record receiving surface.

18. A step in the method of preparing sound record tablets, which consists in subjecting fibrous basic disks containing thermoplastic sizing to the action of heat and pressure against surfaces resistant to the action of the heat and pressure used and before the application of the record receiving surface.

19. The method of producing basic disks or understructures for sound record tablets, which consists in infiltrating a fibrous base with a sizing, and while the sizing is in a condition to flow expressing surplus sizing, then relieving the pressure to cause reabsorption of sizing clinging to the surface of the base, and then causing the solidification of the sizing and subjecting the solidified base to pressure.

20. The method of producing basic disks or understructures for sound record tablets, which consists in infiltrating a fibrous base with a sizing in solution and while the sizing is in a condition to flow, expressing surplus sizing, then relieving the pressure to cause reabsorption of sizing clinging to the surface of the base, then heating the sized base to drive off the solvent and then subjecting the base to pressure.

21. The method of producing basic disks or understructures for sound record tablets, which consists in impregnating such disk with a sizing, then expressing surplus sizing, then relieving pressure, then subjecting the sized base to the action of a vacuum and heat, and then while the sized base is hot subjecting the base to pressure.

22. The method of producing basic disks

or understructures for sound record tablets, which consists in inflating a fibrous base with sizing, then while the sizing is in a condition to flow, expressing surplus sizing, then relieving the pressure to cause reabsorption of sizing clinging to the surface of the base, then subjecting the sized base to the action of sub-atmospheric pressure and heat, then while the base is hot, subjecting it to pressure, then coating the base with thermoplastic sound record material and then producing thereupon a sound record from a matrix of the same under the action of heat and pressure.

23. The method of producing basic disks or understructures for sound record tablets, consisting in infiltrating the disks or understructures with a solution of resinous sizing, placing a plurality of the sized disks or understructures in face to face relation, pressing the disks or understructures together to express surplus sizing, and then relieving the pressure to cause reabsorption of any sizing still on the surfaces, all while the sizing is still in solution.

24. The method of producing basic disks or understructures preparatory to coating them with gramophone record material, consisting in infiltrating the fibrous bases with a solution of a sizing which is hard and resonant when cold and plastic when heated and also has expansion and bending coefficients substantially like those of gramophone record material, grounding the infiltrated bases face to face, applying pressure to the ends of the group to compress the bases and thereby express sizing solution therefrom, and then relieving the pressure and permitting the bases to return toward the uncompressed condition to cause reabsorption of any sizing clinging to the surfaces of the bases.

25. The method of preparing basic disks or understructures for sound-record tablets, which consists in infiltrating fibrous bases with a solution of resinous sizing, and then rendering the surfaces of the bases relatively dry by stacking the infiltrated bases and compressing the stack to express surplus sizing and then relieving the pressure to permit the bases to return toward the uncompressed condition and thereby reabsorb any expressed sizing solution still on the surfaces of the bases.

26. The method of producing sound record tablets which consists in first producing cardboard disks, then infiltrating the disks with thermoplastic sizing in solution, then subjecting the infiltrated disks to pressure to discharge surplus sizing solution, then relieving the pressure to cause reabsorption of sizing solution on the surface of the disks, then evaporating the solvent to cause solidification of the sizing in the disks, then coating the disks with suitable record material.

terial, and finally producing a sound record groove in the record material from a suitable matrix under the action of heat and pressure.

- 5 27. The method of producing sound record tablets, which consists in infiltrating a cardboard base with thermoplastic sizing and while the sizing is in a condition to flow expressing surplus sizing and causing
10 reabsorption of any sizing on the surface of the base to render such surface free enough from sizing for handling at once, coating the base with sound record material and producing thereupon a sound record
15 from a matrix of the same under the action of heat and pressure.

- 20 28. The method of producing sound record tablets, which consists in producing disks of cardboard, infiltrating them under subatmospheric pressure with a solution of

resinous sizing, stacking the infiltrated disks and subjecting them to heavy pressure to discharge surplus sizing solution, relieving the pressure to cause reabsorption of any sizing clinging to the surfaces of the
25 disks to an extent to render them sufficiently surface-dry to permit handling, heating the disks to evaporate the solvent of the sizing, coating the disks with record receiving material and impressing a sound record ma-
30 trix into the record material under the action of heat and pressure.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOSEPH SANDERS.

Witnesses:

F. T. CHAPMAN,
E. DANIELS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

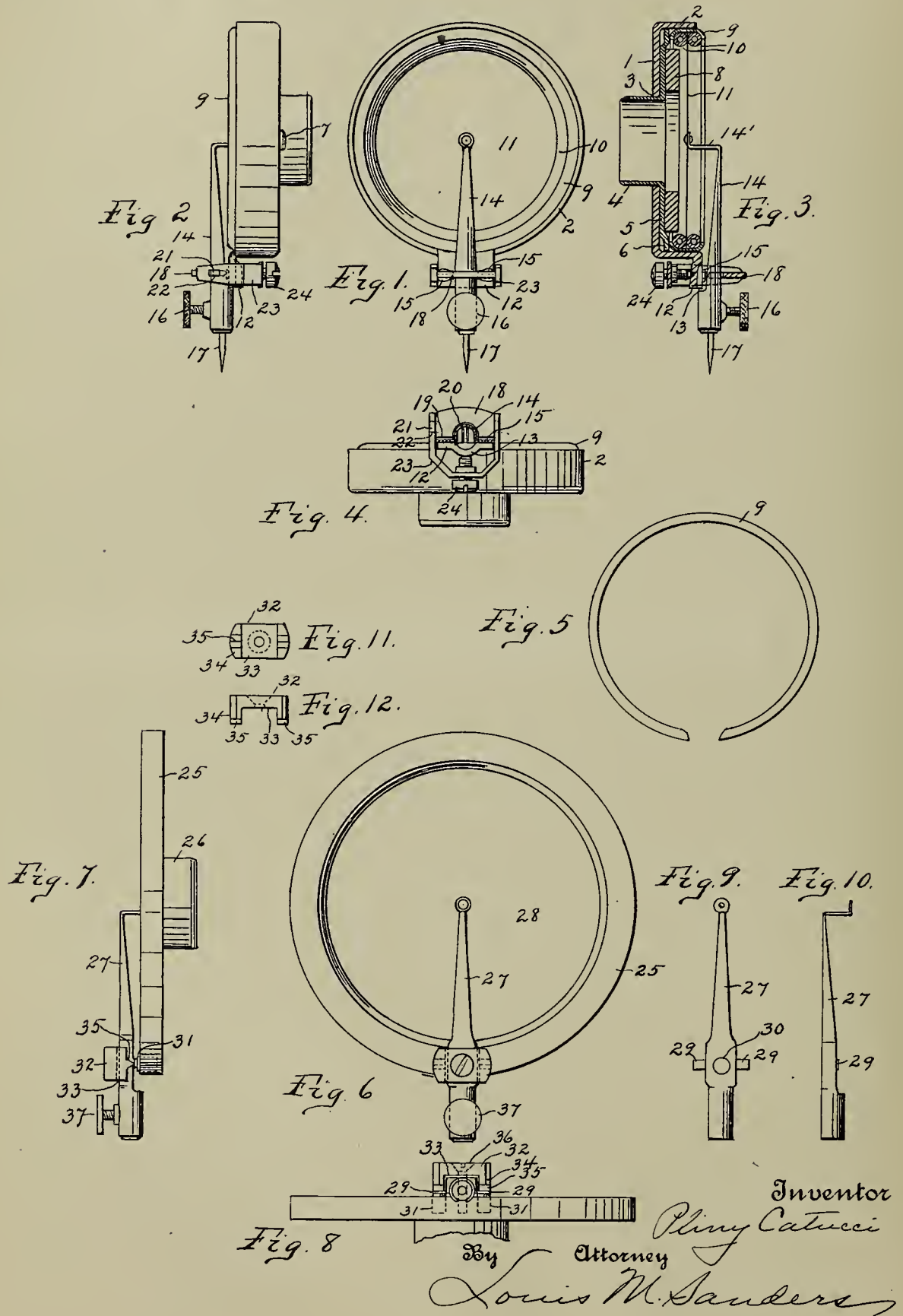
B. Vol. - 1916.

1.180.008 - F. Catucci.

P. CATUCCI.
SOUND BOX.
APPLICATION FILED SEPT. 4, 1915.

1,180,008.

Patented Apr. 18, 1916.



UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

SOUND-BOX.

1,180,008.

Specification of Letters Patent.

Patented Apr. 18, 1916.

Application filed September 4, 1915. Serial No. 48,958.

To all whom it may concern:

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

In my Patent No. 1,059,346, dated April 22nd, 1913, I have described and claimed an improved sound box for talking machines, wherein the stylus lever is secured to the sound box body by means of what I therein term, an equalizing bar, which is so constructed and mounted as to bear with equal pressure upon lateral extending arms from the stylus bar or lever; the equalizing bar having knife edges so that the micro-oscillations of the stylus bar or lever shall be retarded to as slight a degree as possible.

The present invention relates to an improvement in the construction and mounting of the equalizing bar so as to reduce the cost of construction, the number of parts necessary, and yet to preserve all of the advantages of the structure of my prior patent.

It also relates to improvements in the construction of the sound box body and the means for supporting the diaphragm in said body whereby all of the elements of said box body are constructed of pressed metal stamped by means of punches and dies from sheet metal, so that the parts may be assembled and held together by means of what I term the force fit,—that is to say the elements of the box body are so nicely constructed that the parts may be forced together into intimate frictional engagement, so that when assembled the box body forms a substantially integral structure without the possibility of the shifting or rattling of the parts in ordinary use.

In carrying out my invention I make use of the structure as illustrated in the accompanying drawings, wherein—

Figure 1, is a face view of a sound box made in accordance with my improvement. Fig. 2, is a side elevation of the same. Fig. 3, is a sectional view through the center of the sound box and stylus lever. Fig. 4, is a bottom elevation partly in section. Fig. 5, is a plan view of the diaphragm retaining ring. Fig. 6, illustrates a slightly different form of stylus lever support as ap-

plied to what is known in the art as a concert sound box. Fig. 7, is a side elevation, and Fig. 8, is a bottom plan view of the same. Fig. 9, is a plan of the stylus lever. Fig. 10, is a side view of the stylus lever. Fig. 11, is a bottom plan view of the equalizing bar, and Fig. 12, is a detached side elevation of the same.

Similar letters of reference refer to like parts throughout the specification and drawings.

The box body is made up of the cup-shaped element 1, provided with the annular flange 2, and central aperture 3. Into this aperture is forced the thimble 4, by which the sound box is attached to the tone arm of a gramophone or talking machine. The thimble 4, is provided with a lateral extending disk element 5, provided with an offset margin 6. Secured by means of rivets 7 to the elements 1 and 5, is the annular weight 8, which serves the double purpose of adding weight to the sound box, and of reducing the space between the diaphragm and the rear of the box body. The means for supporting the diaphragm in position comprise the channel-shaped open ring 9, together with the tubular gaskets 10. The ring 9, is made of spring metal and when detached is somewhat larger in diameter than the flange 2, so that the ring may be sprung into place and held in position by frictional engagement with the flange 2. The diaphragm 11 is located between the two gaskets 10, as clearly shown in Fig. 3. Projecting from the lower part of the flange 2, and integral therewith, is the stylus supporting arm 12, which is provided with a central depression 13, clearly shown in Fig. 4. The stylus lever 14, has its rectangular arm 14' rigidly secured in any convenient manner to the center of the diaphragm 11, and extends substantially parallel to the plane of the diaphragm over and beyond the projection 12. The stylus lever 14 is provided with lateral arms or wings 15, which rest upon the plain upper surface of the projection 12, which is also provided with a thumb screw 16, by means of which the stylus needle 17 may be held in place.

Firmly bearing upon the arms 15, and pressing them into close contact with the upper face of the projection 12, is the equalizing bar 18, provided with the knife edges

19, for engagement with the upper surfaces of the wings or arms 15. The equalizing bar 18 is provided with the semi-circular notch 20, of sufficient size to permit the body of the stylus lever 14 to pass thereunder without contact therewith. Rigidly secured to the outer ends of the equalizing bar, in any convenient manner, as by means of the lugs 21 entering corresponding apertures 22, and riveted therein, is a yoke 23, which extends beneath the projection 12 and is provided with an adjusting screw 24 to engage the under side of the depressed portion 13 of the projection 12. By this means the knife edges 19 of the equalizing bar 18, may be drawn firmly against the upper surface of the wings 15, and thereby hold the stylus lever firmly in place, at the same time permitting the slight micro-oscillations of the stylus lever 14 without materially retarding or damping them.

In Figs. 6 to 10, I have shown a slightly modified form for use upon what is known as the concert sound box. Such sound boxes are necessarily considerably larger in order to provide for the increased diameter of the diaphragm. In this case the box body 25 and its attaching thimble 26, may be of the form shown, or any convenient form or structure. The stylus lever 27 is connected to the center of the diaphragm 28, in any convenient or desired manner, and projects radially across the rim of the box 25, as clearly shown in Figs. 6 and 7. The lateral arms 29 project from the side of the stylus lever 27, which, by the way, is made of thin, but very stiff sheet metal pressed to shape. It is also provided with an aperture 30 of considerable size, which is in alinement with the two arms 29.

Inserted into the rim of the box 25, underneath the two arms 29, are the two studs or posts 31, in position for the two arms 29 to rest thereon. The equalizing bar 32 in this case consists of a block of metal provided with a channel 33 in its under side, and the two downwardly projecting arms 34, which in turn are provided upon their lower surfaces with the two knife edges 35. These knife edges are made to bear upon the wings or arms 29, and press them into intimate engagement with the exposed ends of the two studs or posts 31. As a means for pressing these arms into such engagement through the medium of the bar 32, I provide the screw 36 which passes through an aperture in the bar 32, and is screwed into the rim of the box body 25. This at once forms a convenient and firm attachment by means of which the stylus lever is firmly held in position and yet permitted all of the micro-oscillations necessary to accurate rendition of sound. The stylus bar 27 is provided with the usual set screw 37 for holding the stylus needle in place.

By the constructions above described, I am enabled to very materially reduce the cost of construction inasmuch as it is well known that pressed or stamped metal parts are very much cheaper than machined parts, and at the same time I am enabled to preserve all of the features of advantage of my prior patent.

By the provision of the equalizing bar 18, and its yoke 23, with the single set screw 24, and the equalizing bar 32 with the set screw 37, the parts of the respective forms are held together by but a single screw. This not only reduces the cost of manufacture of the parts, but at the same time very materially reduces the time and cost of assembling the parts when finished.

While I have shown the equalizing bar 32 as made of a block of metal, yet it is obvious that it may be constructed of a single piece of sheet metal of sufficient gage or thickness and pressed into the general shape indicated in Figs. 11 and 12. If desired, the two posts 31 may be dispensed with and the wings or arms 29 may be permitted to rest directly upon the face of the sound box rim 25. These, however, are minor manufacturing details and would suggest themselves to any person skilled in the art without further illustration or description.

I claim:

1. In a sound box, the combination of a box body, a diaphragm secured therein, a stylus lever centrally secured to said diaphragm, a pair of supporting arms integral with and extending laterally from said lever, an equalizing bar having knife edges thereon for pressing said supporting arms against a part of said box body, and a single screw adjustably connecting said bar to said box body.

2. In a sound box, the combination of a box body and a stylus lever, means for securing said lever to said body comprising a pair of laterally extending arms integral with said lever, an equalizing bar spanning said lever, and having a pair of knife edges which bear with equal pressure upon said arms, and a single screw for securing said bar to said box body.

3. In a sound box, the combination of a box body having a lateral projection thereon, a stylus lever having a lateral arm upon and integral with each side thereof resting upon said projection, an equalizing bar spanning said lever and having a pair of knife edges which bear upon said arms, a yoke extending beneath said projection and connected respectively to the ends of said equalizing bar, and a screw passing through said yoke and bearing upon the underside of said projection for drawing the knife edges of said bar down upon said lateral arms.

4. In a sound box, the combination of a box body and a stylus lever, lateral arms

upon said lever, means for securing said stylus lever to said box body comprising an equalizing bar having knife edges which bear upon and press said arms firmly against said box body, and a screw for securing said equalizing bar to said box body.

5. In a sound box, the combination of a box body having a lateral projection thereon, a stylus lever having elastic arms projecting laterally therefrom, and an equalizing bar spanning said lever secured to said projection by a single screw for firmly pressing said arms upon said lateral projection.

6. In a sound box, the combination of a box body having a lateral projection thereon, a stylus lever having lateral supporting arms bearing upon said projection, equalizing means for firmly pressing said arms with equal pressure upon said projection, and a single screw for securing said equalizing means to said projection.

7. Means for securing a stylus lever to a sound box body, comprising an equalizing bar adapted to span said lever and bear upon and firmly press lateral projections thereon upon a part of said sound box, and

a single screw for centrally securing said bar to said box body.

8. In a sound box, a box body comprising a centrally apertured circular disk having a marginal flange thereon, an open spring ring having inturned marginal flanges, said ring being adapted to be sprung within the marginal flange of said disk, a pair of annular gaskets located within said ring and between its marginal flanges, and a diaphragm located between said gaskets.

9. In a sound box, a box body consisting of an apertured disk having a marginal flange thereon, a tubular thimble having a flat flange thereon, said thimble being secured to said apertured disk by being forced therethrough, and an annular weight concentrically secured to said disk within the flange thereof.

In testimony whereof, I have hereunto set my hand this 28th day of August, 1915.

PLINY CATUCCI.

In presence of—

L. M. SANDERS,
NORMAN E. ZUSI.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND BOX DIAPHRAGM,
1,180,401-----E. R. Johnson,
Patented-April 25th, 1916.
Filed-February 16th, 1912.

1,180,401.

Patented Apr. 25, 1916.
4 SHEETS—SHEET 1.

Fig. 1.

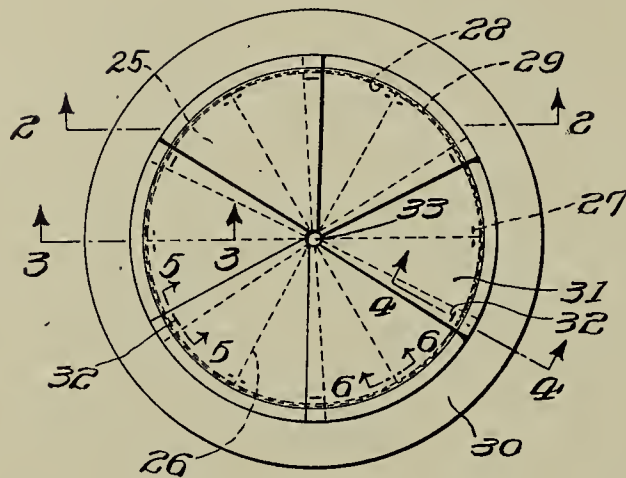


Fig. 2.

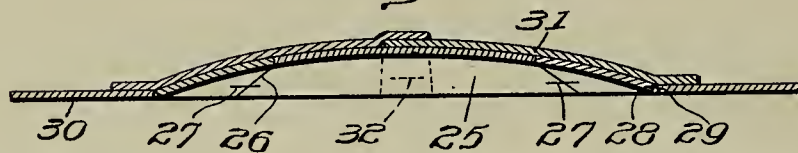


Fig. 3.

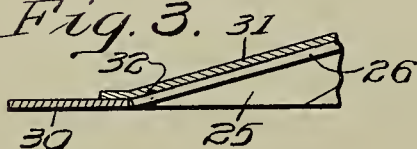


Fig. 4.



Fig. 7.

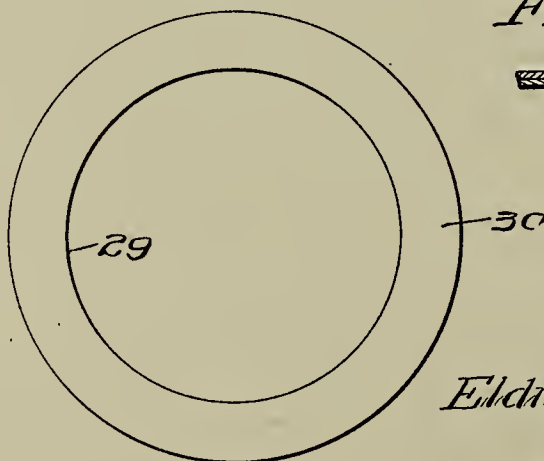
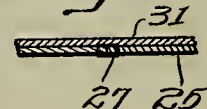


Fig. 5.



Fig. 6.



WITNESSES

F. J. Hartman.

Clifton C. Hallenbeck

BY

INVENTOR
Eldridge R. Johnson.

I. M. Kelly.

ATTORNEY

1,180,401.

Patented Apr. 25, 1916.
4 SHEETS—SHEET 2.

Fig. 8.

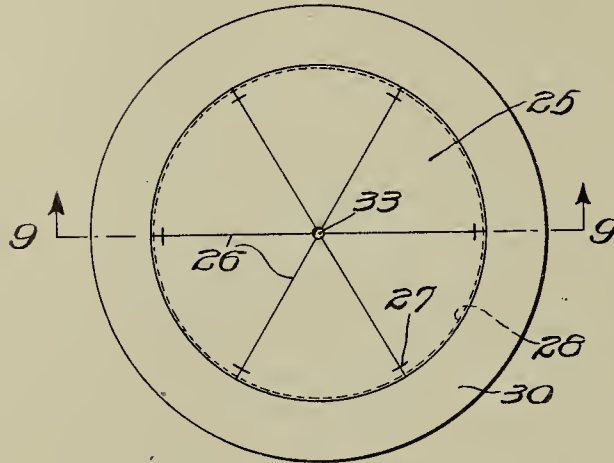


Fig. 9.

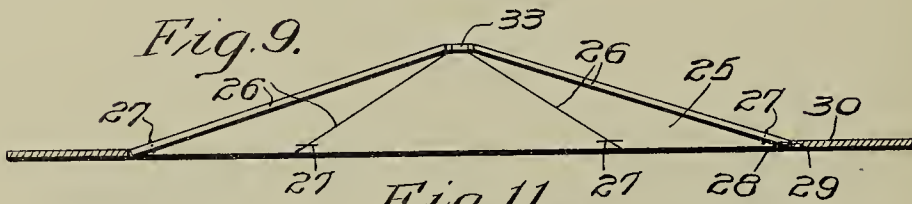


Fig. 11.

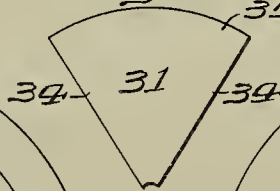


Fig. 12.

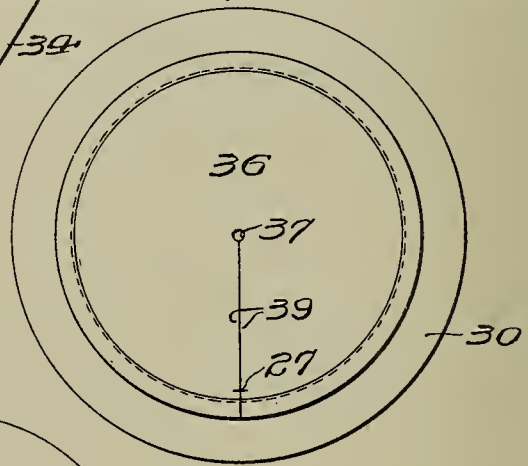


Fig. 10.

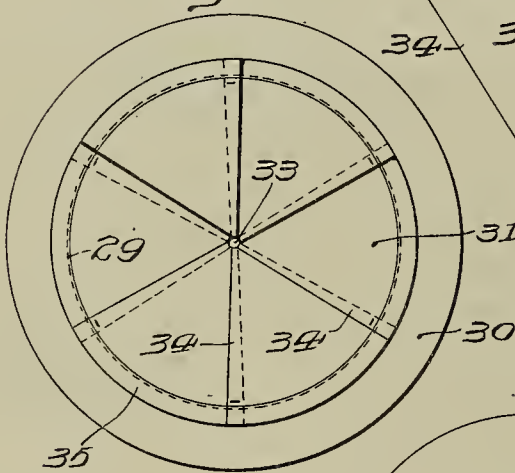
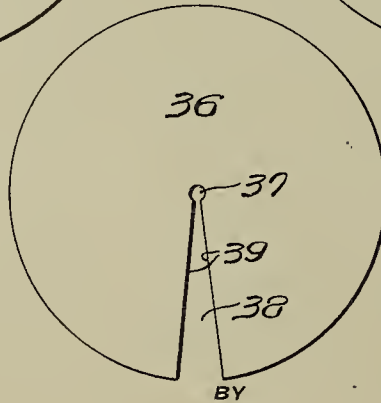


Fig. 13.



WITNESSES
F. J. Hartman.
Clifton C. Halliwell

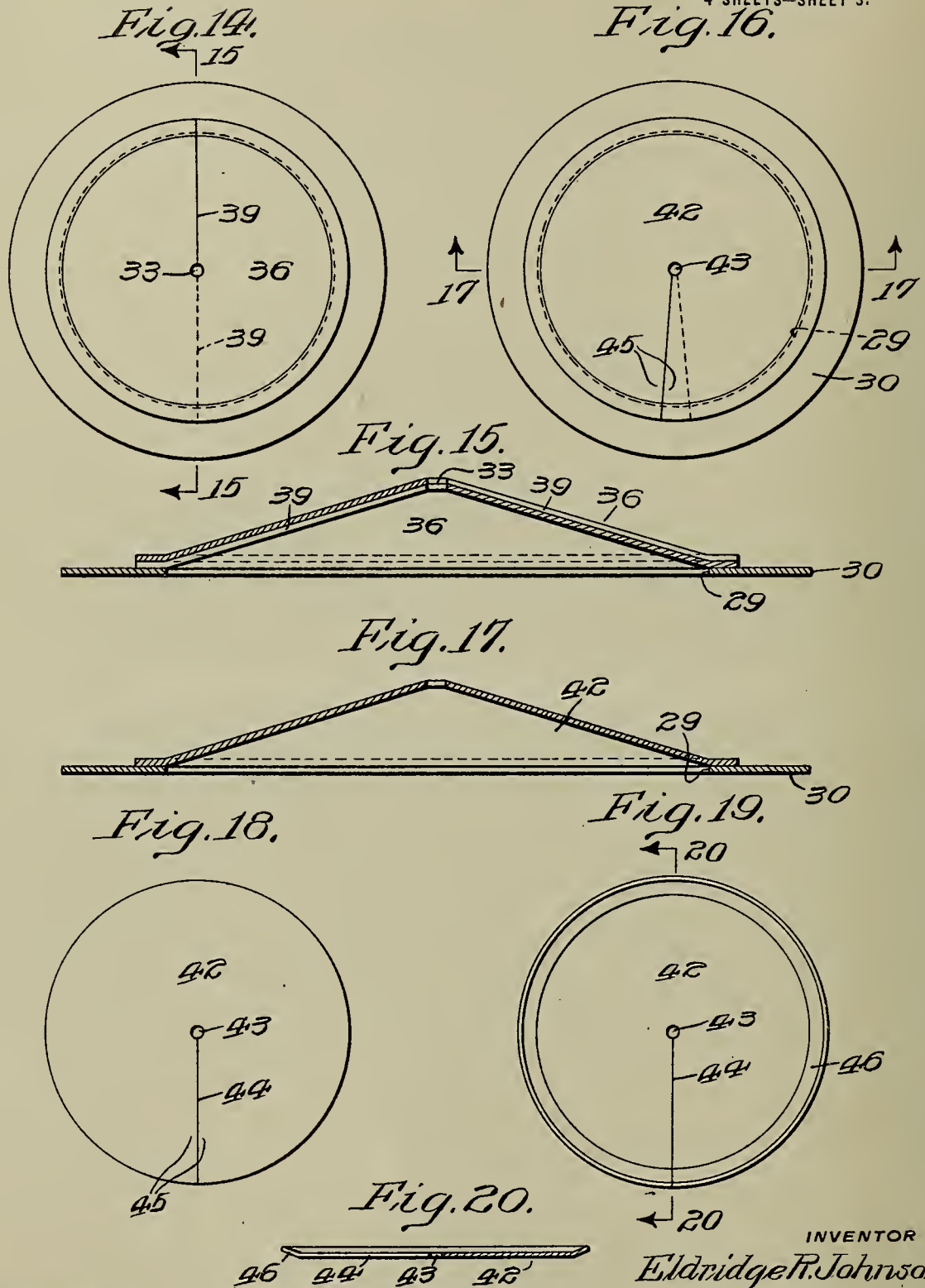
INVENTOR
Eldridge R. Johnson
1/10/16

ATTORNEY

1,180,401.

Patented Apr. 25, 1916.

4 SHEETS—SHEET 3.



WITNESSES
F. J. Hartman.
Clifton C. Halliwell

BY

INVENTOR
Eldridge R. Johnson
1 May 1916.

ATTORNEY

1,180,401.

Patented Apr. 25, 1916.
4 SHEETS—SHEET 4.

Fig. 21.

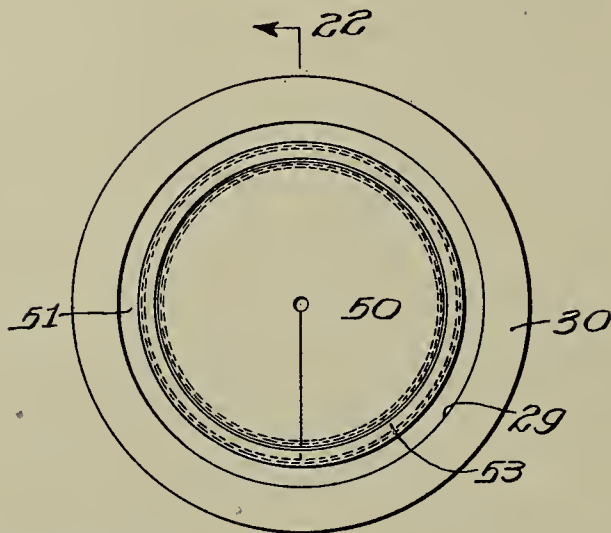


Fig. 22.

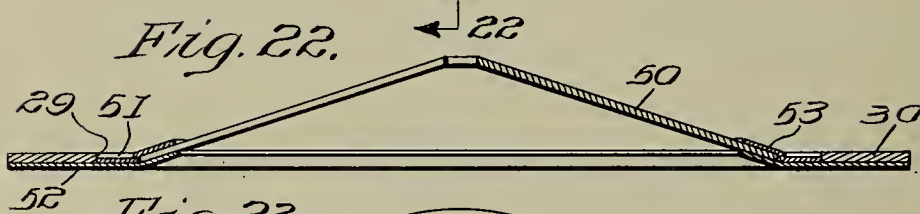


Fig. 23.

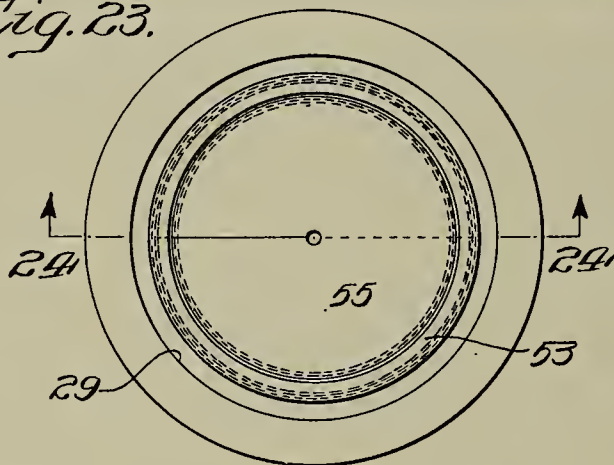
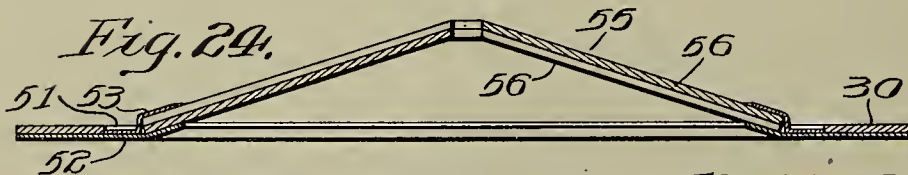


Fig. 24.



WITNESSES

F. J. Hartman.

Clifton C. Hallowell

BY

INVENTOR
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Wm. Feltz.

ATTORNEY

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX DIAPHRAGM.

1,180,401.

Specification of Letters Patent.

Patented Apr. 25, 1916.

Application filed February 16, 1912. Serial No. 678,120.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of Merion, county of Montgomery, and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Box Diaphragms, whereof the following is a specification, reference being had to the accompanying drawings.

This invention is particularly directed to vibratory diaphragms for sound recording and reproducing devices, such as may preferably be adapted to the sound reproducing mechanism of a talking machine.

The principal object of this invention is, to provide a diaphragm that will readily respond to the most delicate and rapid vibrations, and accurately record and reproduce all of the high and low tones and the included range with equal clearness and with substantially the same intensity as the original sounds.

Other objects of this invention are, to provide a diaphragm of such construction as to substantially eliminate any stresses and strains that tend to produce false tones or in any way affect the intensity, accuracy and clearness of the reproduction; to provide a diaphragm having its engaged periphery formed of a relatively narrow separate member, and having its major portion separately formed and secured thereto.

Other objects of this invention are, to provide a diaphragm having a bulged major portion formed of a radially slitted disk of sheet material, such as mica, isinglass, celluloid, paper, and similar materials, having its opposed edges secured in overlapped relation; to provide a diaphragm having a bulged major portion formed of a peripherally recessed disk of sheet material having its opposed edges secured in abutted relation; to provide a diaphragm having a bulged major portion formed of a plurality of sectoral sections respectively secured together, with their edges in overlapped relation; to provide a diaphragm having a bulged major portion formed of a plurality of sectoral sections respectively secured together, with their edges abutted; to provide a diaphragm having a bulged laminated portion formed of separate pieces

having abutted edges, the abutted edges of the respective laminations being relatively out of registry; to provide a diaphragm having a bulged major portion formed of sections respectively having their edges secured to the edges of adjacent sections by stitching; to provide a diaphragm having a bulged major portion provided with a peripheral integral flange extended at an angle with respect to the central portion and in a plane normal to the axis of said diaphragm; and to provide a diaphragm having a bulged major portion, connected with a separate annular flange spaced therefrom by an annular web of relatively thin material.

Generally stated, the form of this invention hereinafter described provides a flat, annular, vibratory flange, to which is secured a bulged or conical substantially inflexible major portion adapted to reciprocate as a whole within the engaged peripheral edge of said annular flange.

In the accompanying drawings, Figure 1 is a face view of a diaphragm showing a convenient embodiment of this invention; Fig. 2 is a sectional view of said diaphragm taken on the line 2—2 in Fig. 1; Fig. 3 is a fragmentary sectional view of said diaphragm taken on the line 3—3 in Fig. 1; Fig. 4 is a fragmentary sectional view of said diaphragm taken on the line 4—4 in Fig. 1; Fig. 5 is a fragmentary sectional view of said diaphragm taken on the line 5—5 in Fig. 1; Fig. 6 is a sectional view of said diaphragm taken on the line 6—6 in Fig. 1; Fig. 7 is a face view of the annular peripheral supporting flange, *per se*; Fig. 8 is a face view of a modification of the diaphragm shown in Fig. 1; Fig. 9 is a central transverse sectional view of the diaphragm shown in Fig. 8, taken on the line 9—9 in said figure; Fig. 10 is a face view of another modification of the diaphragm shown in Fig. 1; Fig. 11 is a face view of one of the segments forming the conical central portion of the diaphragm shown in Fig. 10; Fig. 12 is another modification of the diaphragm shown in Fig. 1; Fig. 13 is a face view of the flat blank from which the central portion of the diaphragm shown in Fig. 12 is formed; Fig. 14 is a face view

of another modification of the diaphragm shown in Fig. 1; Fig. 15 is a central transverse sectional view of the diaphragm shown in Fig. 14, taken on the line 15—15 in said figure; Fig. 16 is a face view of another modification of the diaphragm shown in Fig. 1; Fig. 17 is a central transverse sectional view of the diaphragm shown in Fig. 16, taken on the line 17—17 in said figure; Fig. 18 is a face view of the flat blank from which the central portion of the diaphragm shown in Figs. 16 and 17 is formed; Fig. 19 is a face view of the blank shown in Fig. 18, having its peripheral margin slightly turned up to form a flange for engagement with the annular ring shown in Fig. 7; Fig. 20 is a central transverse sectional view of the blank shown in Fig. 19, taken on the line 20—20 in said figure; Fig. 21 is a face view of another modified form of diaphragm; Fig. 22 is a central transverse sectional view of the diaphragm shown in Fig. 21, taken on the line 22—22 in said figure; Fig. 23 is a face view of another form of the diaphragm shown in Fig. 21; and Fig. 24 is a central transverse sectional view of the diaphragm shown in Fig. 23, taken on the line 24—24 in said figure.

In the omnibus form of this invention shown in Fig. 1 of the drawings, the central major portion of the diaphragm comprises a laminated structure formed of a plurality of sectoral members 25, respectively having their radial or lateral edges 26 abutted and joined by stitches 27, and having their circumferential or outer edges 28 abutted with the inner edge 29 of the peripheral annular supporting flange member 30. Superimposed upon the conical structure formed by the sectoral members 25, are a plurality of relatively broad sectoral members 31 respectively having their radial or lateral margins overlapping the margins of their adjacent members and conveniently secured together by any suitable means, preferably by an adhesive or by stitches 32, or both, and having their circumferential margins overlapping the annular flange 30.

As best shown in Fig. 1, the abutted edges of the sectoral members 25 are preferably disposed intermediate of the overlapped margins of the sectoral members 31. The diaphragm thus formed is preferably provided with a central aperture 33, for the convenient attachment with a stylus bar (not shown).

The form of this invention shown in Figs. 8 and 9 is a simplification of the diaphragm shown in Figs. 1 to 7, inclusive, and comprises a major central conical portion formed of sectoral members 25, preferably secured together by stitches 27, and having their circumferential or outer edges 28 in abutted relation to the inner edge 29 of the annular flange member 30, as the sub-

jacent lamina formed by the members 25, shown in Fig. 1. The abutted radial or lateral edges 26 of the members 25, and the abutted circumferential or outer edges 28 of said sectoral members 25, and the edges 29 of the annular flange member 30 may preferably be secured by a suitable adhesive to form a substantially integral structure.

It is to be understood that while the stitches 27 are shown as disposed only near the periphery of the conical structure formed by the sectoral members 25, said sectoral members may be secured together by stitches disposed at different regions along the abutted edges, and, furthermore, the conical structure formed by said sectoral members 25 may be secured to the annular flange member 30 by stitches in the same manner.

The form of this invention shown in Figs. 10 and 11 is another simplification of the structure shown in Figs. 1 to 7, inclusive, and comprises the annular flange member 30, and the central conical major portion comprising the sectoral members 31 respectively having their radial or lateral margins 34 in overlapped relation with the adjacent sections, and their circumferential margins 35 flanged in a plane normal to the axis of the conical structure thus formed, and preferably secured by an adhesive in overlapped relation with the inner margin adjacent to the edge 29 of the annular flange member 30.

The form of this invention shown in Figs. 12 and 13 is a still further simplification of the structure shown in Figs. 1 to 7, inclusive, and comprises the annular flange member 30, and the central conical major portion formed of a single piece 36 of sheet material having a central circular opening 37 and a V-shaped recess 38, forming opposed edges 39 which are substantially radial to the center of the piece 36. The radial edges 39 formed by the recess 38 in the piece 36 are brought together and secured, preferably by an adhesive or by the stitches 27, or both, as shown in Fig. 12, thus forming a conical major portion having a periphery of greater diameter than the inner diameter of the annular flange member 30, and having its peripheral margin in overlapped relation with the inner margin of the annular flange member 30, and secured thereto in any suitable manner, preferably by an adhesive.

The form of this invention shown in Figs. 14 and 15 is a structure similar to the form of the invention shown in Figs. 12 and 13, but having the central conical major portion laminated and comprising superimposed conically formed pieces 36 of sheet material, secured together with their respective abutted edges 39 disposed out of registry; that is to say, the abutted edges 39 of the subjacent conically formed piece 36 be-

ing disposed beneath an uncut portion of the web of the superjacent conically formed piece 36, and the abutted edges 39 of said superjacent member being disposed over an uncut portion of the web of said subjacent member, the abutted edges 39 of the respective lamina being preferably disposed in alinement, as best shown in Fig. 14, the conical central major portion overlapping, and being secured to the inner margin of the annular flange member 30, adjacent to the edge 29.

The form of this invention shown in Figs. 16 to 20, inclusive, comprises a still further simplified structure, comprising the annular flange member 30, and the central conical major portion formed of a single piece 42 of sheet material, which, as best shown in Fig. 18, is a circular disk having a central aperture 43, and provided with a radial slit 44, forming opposed edges, the margins 45 along which may be overlapped, as shown in Fig. 16, to form the central conical substantially inflexible major portion of the diaphragm.

As shown in Figs. 19 and 20, the peripheral margin of the piece 42 may be slightly upturned to form a marginal flange 46 (see Fig. 20) before having the edges of the slit 44 overlapped. Thus it will be seen that when the margins 45 along the edges of the slit 44 are overlapped and secured together to form the conical piece 42, the flange 46 will occupy a position in a plane substantially normal to the axis of the conical central major portion formed by the piece 42, which flange 46 may be readily secured in any suitable manner, in overlapped relation with the inner margin of the annular flange member 30, as shown in Figs. 16 and 17.

The form of this invention shown in Figs. 21 and 22 is similar to the form shown in Figs. 12 and 13, in so far as the central conical major portion is concerned. In this form of the invention, however, the diameter of the conical central portion 50 is less than the inner diameter of the annular flange member 30, so, as best shown in Fig. 22, an annular gap 51 is formed between the outer periphery of the central portion 50 and the inner edge 29 of the annular flange member 30.

As best shown in Fig. 22, the central conical portion 50 may be secured to the annular flange member 30 by a relatively thin annular membrane 52, which is suitably secured to one face of the annular flange member 30, and to the inner peripheral margin of said conical portion 50, and an annular membrane 53 secured to the membrane 52 between the inner edge 29 of the annular flange member 30 and the outer edge of the portion 50, and overlapping the peripheral margin of said portion 50 and secured to its outer face. By this construction it will be

seen that the central portion 50 being substantially inflexible, has a great freedom of reciprocation with respect to the flange member 30, with which it is connected by the relatively thin and highly flexible membrane. 70

The form of this invention shown in Figs. 23 and 24 is similar to the form shown in Figs. 14 and 15, in so far as the central conical portion of the diaphragm is concerned, and comprises the conical central major portion 55 formed of lamina members 56, substantially formed as shown in Fig. 13 and placed together substantially as shown in Figs. 14 and 15, inclusive. In this form of the invention, like the form shown in Figs. 21 and 22, the outer periphery of the central conical major portion of the diaphragm is less than the diameter of the inner edge of the annular flange member 30, and is joined by the membranes 52 and 53 respectively, as in said Figs. 21 and 22. 75 80 85

It is believed that by forming a diaphragm with an annular flange which is separate from and secured to a separately formed conical central major portion in the manner above set forth, undesirable strains and stresses which would be incident to the forming of a diaphragm of a single piece of sheet material having its central portion bulged, will be substantially eliminated, and the annular flange thus formed will be therefore more susceptible in responding to the vibrations occasioned by sound waves, than if the diaphragm were formed of a single piece. 90 95 100

Although the diaphragm as above described is referred to generally as being formed of sheet material, it is to be understood that it is preferable to form said diaphragm of mica or like material, which, as will be noted, may be readily cut and formed into the desired shapes, and which may have its parts secured by stitching, to prevent the accidental separation of said parts. 105 110

It is not desired to limit this invention to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of the invention as defined in the appended claims. 115

Having thus described my invention, I claim:

1. In a diaphragm, the combination with a separately formed annular flange member of sheet material, having inner and outer edges, of a conical central major portion having a central aperture and comprising a sectoral section of sheet material having radial edges secured together and a peripheral edge secured to the inner edge of said flange member. 120 125

2. In a diaphragm, the combination with a separately formed annular peripheral 130

flange member of sheet material, of a conical central major portion having a central aperture and comprising a sectoral section of sheet material, having radial edges secured together and a margin secured in overlapped relation with the inner margin of said annular flange member.

3. In a diaphragm, the combination with a separately formed annular member of sheet material, having inner and outer edges, of a substantially conical central major portion having a central aperture and comprising a sectoral section of sheet material, having its radial edges secured together, and its peripheral edge secured to the inner edge of said annular member.

4. In a diaphragm, the combination with a separately formed annular member, of a conical central major portion comprising a sectoral section, having its radial edges secured together and its peripheral edge extended over the inner margin of said annular member and secured thereto.

5. In a diaphragm, the combination with a separately formed annular member, of a conical central major portion comprising a sectoral section of sheet material, having its radial edges secured together, and its peripheral margin extended to form a flange, in a plane normal to the axis of the conical structure thus formed, and means for securing said flanged portion with said annular member.

6. In a diaphragm, the combination with a separately formed annular member, of a conical central major portion comprising a sectoral section of sheet material, having the margins along its radial edges secured in overlapped relation, and its peripheral edge secured to said annular member.

7. In a diaphragm, the combination with a separately formed annular member of sheet material, of a conical central major portion comprising a sectoral section of sheet material, comprising a substantially circular disk having a radial slit, the margins along said slit being secured in overlapped relation, and having its peripheral margin secured to said annular member.

8. In a diaphragm, the combination with a separately formed annular member, of a bulged central major portion having a central aperture and comprising a sectoral section of sheet material formed of a disk having a radial slit, the margins along said slit being secured in overlapped relation, and the peripheral margin being flanged in a plane normal to the axis of the bulged structure thus formed, said flange being secured in overlapped relation with said annular member.

9. In a diaphragm, the combination with a separately formed member of sheet material, having inner and outer edges, of a conical central major portion comprising a

sectoral piece of sheet material, having its lateral margins secured in overlapped relation, and having its outer margin extended over a portion of said annular member and secured thereto.

10. A diaphragm formed of an annular peripheral member of sheet material, and a separately formed central major portion comprising a disk of sheet material slitted radially and having its peripheral edge upturned to form a flange for engagement with said peripheral member.

11. A diaphragm formed of an annular peripheral member of mica, and a separately formed central major portion comprising a disk of mica slitted radially and having its peripheral edge upturned to form a flange for engagement with said peripheral member.

12. A diaphragm formed of a peripheral member of mica, and a separately formed central major portion comprising a disk of mica slitted radially and having its marginal radial edges overlapped and secured together by stitches.

13. A diaphragm comprising an annular member forming the outer portion of the diaphragm, and a cup-shaped member having an outer marginal edge secured to said annular member, and having edges secured together and extending inwardly from said marginal member, said cup-shaped member forming the central portion of said diaphragm.

14. A diaphragm comprising a substantially flat annular member forming the outer part of the diaphragm, and a cup-shaped member secured marginally to the inner margin of said annular member and provided with radial edges secured together.

15. A diaphragm comprising a substantially flat annular member forming the outer part of the diaphragm, and a cup-shaped member secured marginally to the inner margin of said annular member and provided with radial overlapped edges secured together.

16. In a diaphragm, the combination with a separately formed annular member of sheet material, having inner and outer edges, of a cup-shaped central major portion, comprising sheet material having edges secured together and extending from the inner edge of said annular member inwardly, and having a peripheral edge secured to the inner edge of said annular member.

17. A diaphragm comprising a cup-shaped member having edges extending from the periphery of the disk inwardly and secured together, and an annular member of sheet material, secured to the marginal portion of said disk.

18. A diaphragm comprising an annular member forming the outer portion of the

diaphragm and a disk of sheet material slit
from the periphery thereof toward the cen-
ter and having the edges adjacent said slit
secured together to form a cupped member
5 and the edge of the cupped member so
formed being secured to the inner edge of
said annular member.

In witness whereof, I have hereto set
my hand this 9th day of February, A. D.
1912.

ELDRIDGE R. JOHNSON.

Witnesses:

CHARLES F. WILLARD,
FRANK B. MIDDLETON, Jr.

**Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."**

The first part of the book is devoted to a general survey of the history of the world, from the beginning of time to the present day. It is divided into three main sections: the prehistoric period, the classical period, and the modern period. The prehistoric period covers the time from the beginning of the world to the invention of writing. The classical period covers the time from the invention of writing to the fall of the Roman Empire. The modern period covers the time from the fall of the Roman Empire to the present day.

The second part of the book is devoted to a detailed study of the history of the world, from the beginning of time to the present day. It is divided into three main sections: the prehistoric period, the classical period, and the modern period. The prehistoric period covers the time from the beginning of the world to the invention of writing. The classical period covers the time from the invention of writing to the fall of the Roman Empire. The modern period covers the time from the fall of the Roman Empire to the present day.

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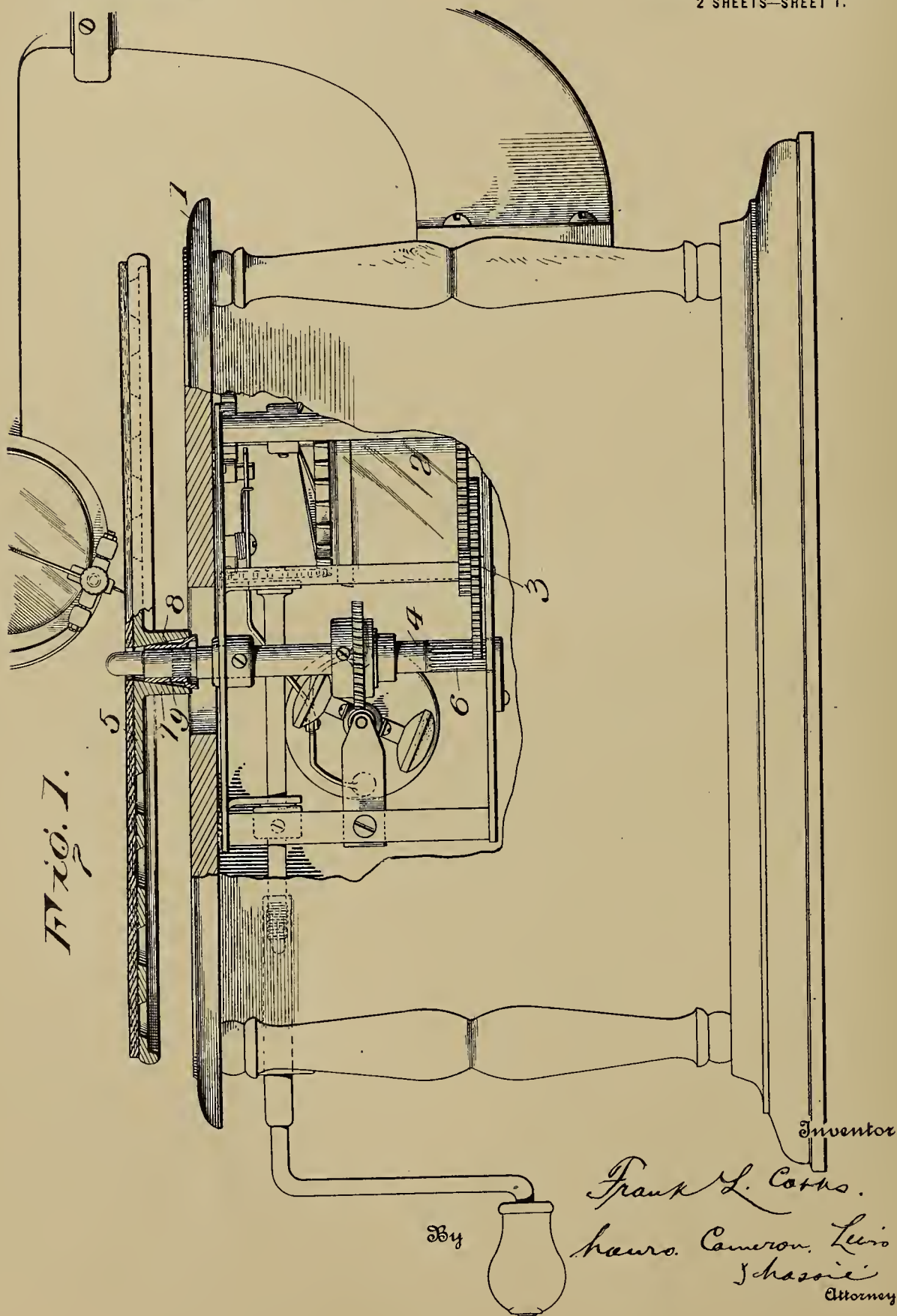
MOUNTING FOR RECORD SUPPORTING
TABLETS IN TALKING MACHINES,

1,181,108-----F.L.Capps,
Patented-May 2nd, 1916.
Filed-June 1st, 1915.

F. L. CAPPS.
MOUNTING FOR RECORD SUPPORTING TABLES IN TALKING MACHINES.
APPLICATION FILED JUNE 1, 1915.

1,181,108.

Patented May 2, 1916.
2 SHEETS—SHEET 1.



F. L. CAPPS.
MOUNTING FOR RECORD SUPPORTING TABLES IN TALKING MACHINES.
APPLICATION FILED JUNE 1, 1915.

1,181,108.

Patented May 2, 1916.
2 SHEETS—SHEET 2.

Fig. 2.

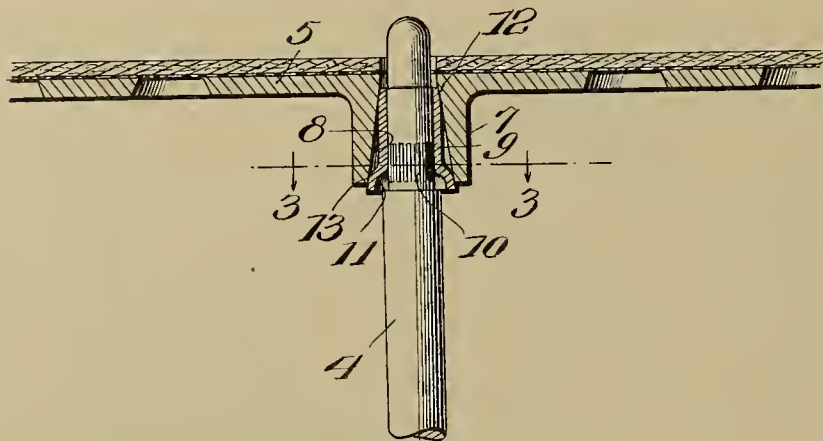


Fig. 4.

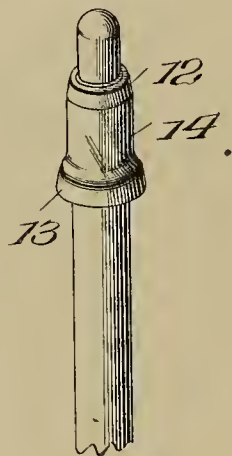


Fig. 3.

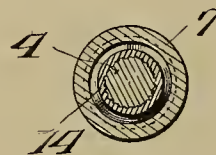
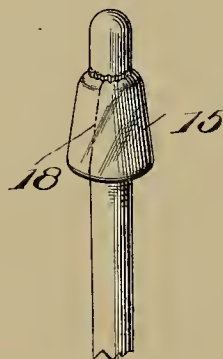
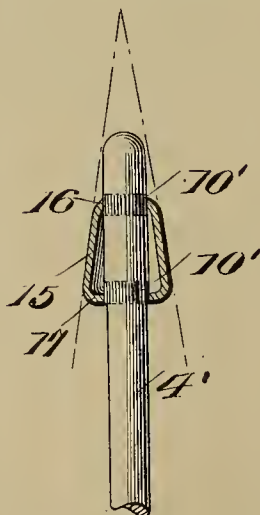


Fig. 5.

Fig. 6.



Inventor

Frank L. Capps.

By
Hans. Cameron. Lewis & Massie

Attorney

UNITED STATES PATENT OFFICE.

FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

MOUNTING FOR RECORD-SUPPORTING TABLES IN TALKING-MACHINES.

1,181,108.

Specification of Letters Patent.

Patented May 2, 1916.

Application filed June 1, 1915. Serial No. 31,463.

To all whom it may concern:

Be it known that I, FRANK L. CAPPS, a citizen of the United States of America, and a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Mountings for Record-Supporting Tables in Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to improvements in talking machines, and more particularly to the mounting for the turn-table which supports the record in the disk type of talking machines. In machines of this type, there is provided a vertical motor-driven shaft upon whose upwardly projecting free end a turn-table for the record is removably mounted. The turn-table is usually composed of metal and is of considerable weight in order to insure steadiness of movement, and is provided with a downwardly projecting centrally located hub having a conical vertical central opening formed therein to receive the correspondingly shaped upper end of the vertical driving shaft of the machine. The turn-table is secured to the motor purely by the wedging action due to its weight and the conical engagement of the hub of the turn-table with the shaft. Here-
tofore, the conical bearing upon the shaft has usually been formed by driving upon the shaft a section of a brass tube, whose exterior diameter slightly exceeds the interior diameter of the base of the conical opening through the hub of the table. The exterior portion of the section of the brass tube has been turned down into conical form, so as to accurately fit the conical opening in the turn-table. The lower portion of the hub of the turn-table projects considerably below the lower surface of the turn-table itself, for the purpose of giving vertical extent of bearing of the turn-table on the shaft, in order that the turn-table may be firmly located thereon and prevent rocking and insure its steady movement in a horizontal plane during the revolution of the shaft. It is therefore important that the hub of the turn-table should have bearing upon the brass tubular cone of the shaft at the upper portion of the said hub and at the lower portion to secure the stability required, but it is not necessary that the hub should contact with

the brass cone upon the shaft throughout its entire vertical length. In fact, it is desirable that it should not so contact, in order to reduce the frictional surfaces between the interior of the hub and the cone on the shaft and thus facilitate the ready removal of the table from the shaft by merely lifting it therefrom. With this end in view, the cone bearing on the shaft has a central zone between its upper and lower portions slightly turned away so that the interior of the hub of the table contacts only with the upper and the lower portions of the cone on the shaft.

The construction just described involves a material expense in the material required for the cone upon the shaft, a waste of the material which is turned away to form the cone, and the employment of skilled labor to turn down the section of brass tubing to form the conical bearing on the shaft.

The object of the present invention is to provide the required conical bearing upon the shaft for the turn-table at a very material reduction in cost of material and labor required in the manufacture of the aforesaid conical bearing upon the shaft.

With this end in view, the invention consists in providing a section of thin tubing, preferably of brass and approximately of about three-quarters of an inch in length and having uniform internal and external diameters, the internal diameter being such as to cause said tubular section to fit tightly upon the upper end of the motor shaft, and the external diameter being but slightly in excess of the diameter of the conical bearing in the hub of the turn-table at its upper portion. This tubular section is then pressed or drawn or otherwise suitably treated to cause its lower end to be flared out and its diameter thus increased until its external diameter slightly exceeds that of the internal diameter of the conical opening in the hub of the turn-table at its base. The upper end portion of this tubular section thus prepared is then turned off to form a perfect cone to fit the upper portion of the conical opening in the hub of the turn-table, and the exterior portion of the flared lower end is also turned off along the lines of a true cone, in order that it may accurately fit within the internal portion of the base of the conical opening in the turn-table.

By this means, the amount of material in the tubular section, which is usually an expensive metal such as brass, is materially reduced. The amount of waste in the form of shavings that are turned off is reduced, and the amount of labor in turning the part is very largely reduced.

The inventive idea is illustrated in the accompanying drawings, in which:—

Figure 1 is a broken side elevation of a talking machine, with parts shown in section, and illustrating the improved bearing in position on the machine with the turn-table in position; Fig. 2 is a detail, on an enlarged scale, showing the vertical shaft with the bearing thereon and the hub of the turn-table in position; Fig. 3 is a horizontal section on the line 3—3 of Fig. 2, looking in the direction of the arrows; Fig. 4 is a side elevation of the shaft with the conical bearing thereon; Figs. 5 and 6 are, respectively, a vertical section and side elevation of another form of the invention.

Referring to the drawings, in which like reference numerals indicate like parts throughout the several views, 1 indicates the frame-work of the usual or any suitable disk talking machine provided with a suitable motor 2 connected by gearing 3 with the lower end of the shaft 4 for carrying the turn-table 5, upon which table the record is supported in the way well known in this art. The lower end of the shaft 4 is provided with gearing to engage with the gear 3 driven by the motor, and is here shown as formed by a gear 6 cut directly in the steel shaft. On the under side of the table 5, there is provided the usual downwardly projecting hub 7 having the usual conical opening 8 formed therein. On the upper portion of the shaft 4, there is mounted a section of thin tubing 9 of any suitable hard metal, preferably brass, which section is of such internal diameter as to fit tightly upon the shaft when it is driven thereon, so that it revolves with the shaft. Preferably, the shaft is roughened, as at 10, Fig. 2, to insure a tight fit and prevent relative turning movement between the tubular section 9 and the shaft 4. The tubular section 9 is flared outwardly at its lower part, as at 11. The external diameter of the tubular section at its upper part slightly exceeds the internal diameter of the conical opening in the hub at its upper portion, and the external diameter of the flare 11 slightly exceeds the internal diameter of the base of the conical opening in said hub, when the said tubular section is placed in position on the shaft in the course of manufacture. The shaft is then put in a turning lathe and the upper exterior corner or edge portion of the tubular section is cut away along the lines of a true cone, at 12, and the lower flared portion 11 is cut away along the lines of a true

cone, at 13, so that when the turn-table 5 is placed in position the interior conical opening 8 in the hub 7 engages the conical portions 12 and 13 on the tubular section, but does not engage said tubular section between the conical portions 12 and 13. It will be perceived that the section of expensive brass tube employed in this construction is much thinner and therefore less expensive than the section of brass tube required in the manufacture of the old form of bearing or support, and that the amount of turning required is very much less than in the old form, it being merely necessary for the workman to trim off a very slight portion to form the surfaces 12 and 13; and that no turning is necessary to produce the depressed portion 14 on the bearing between the conical portions 12 and 13. This results not only in a saving of the time of expert workmen required to effect the turning, but also a very great saving in the weight of material that is turned off. At the same time the turn-table is provided with the requisite firm bearing both at the top and at the bottom portion of its hub, thereby insuring a perfect steadiness of movement free from tilting and rocking action.

In Figs. 5 and 6 is illustrated another form of bearing that may be employed when it is not desired to provide the intermediate non-flaring surface 14. In this form of the invention, the shaft 4' is provided with two knurled surfaces 10', 10', and a section 15 of thin hard metal tubing, as brass, has its upper end 16 and its lower end 17 turned inwardly to tightly engage the knurled surfaces 10', 10', respectively. The shouldered end 17 at the lower portion of said tubular section is greater than the shouldered or inwardly turned portion 16 at the upper end of the tubular section, so that the part 15 forms approximately a cone. The outer surface of this section is then turned to a true cone corresponding to the internal conical opening in the hub 7 of the turn-table 5. Instead of forming this bearing portion 15 of a section of tubing, it may be formed of sheet brass rolled into the proper form with its edges meeting along the line 18, Fig. 6.

It will be readily understood by those skilled in the art that the invention herein described may be embodied in a variety of mechanical forms without departing from the spirit of the invention, and such modifications and forms are designed to be covered by the appended claims.

What is claimed is:—

1. In a talking machine, the combination of a sound-record-receiving table having a vertical central conical opening formed therein, a vertical shaft for driving said turn-table, a motor in operative relation with said shaft, and a bearing or turn-table support on said shaft, said bearing consist-

ing of a section of thin metal tubing flared outwardly at its base and having a conical surface formed adjacent to its upper end and a conical surface formed on said outwardly flared portion.

2. In a talking machine, the combination of a sound-record-receiving table having a downwardly projecting hub on the under side thereof and located in the axis of said table, said hub being provided with a vertical axial conical opening, with a motor-driven vertical shaft for supporting and driving said table, said shaft having a bearing or support for the table comprising a section of thin metal tubing secured on said shaft to revolve therewith and having a flared base portion, the outer surface of said base portion being formed as a conical surface to receive and fit the conical opening formed in said hub.

3. In a talking machine, the combination of a sound-record-receiving turn-table having a conical opening therein, a vertical motor-driven shaft for driving said table, said shaft being provided with a bearing or support for said table consisting of a section of thin metal tubing secured to and revolving with said shaft and having a flared base portion, said flared portion being provided with a conical outer surface fitting within the base of the conical opening in the turn-table and a second conical surface formed on said section of metal tubing above said flared portion.

4. In a talking machine, the combination of a sound-record-receiving turn-table having a central vertical conical opening formed therein, a motor-driven shaft supporting and driving said table, said shaft being provided with a bearing or support for the table consisting of a section of thin metal tubing having a flared and a non-flared portion, said flared portion being provided with a conical surface fitting a portion of the conical surface of the opening in the table, and a second conical surface on the non-

flared portion of said section of metal tubing and also fitting a portion of the surface of the conical opening in said turn-table.

5. In a talking machine, the combination of a sound-record-receiving turn-table having a central vertical conical opening formed therein with a motor-driven vertical shaft supporting and driving said table, said shaft being provided with a bearing or support for said table consisting of a section of thin metal tubing having a flared and a non-flared portion, and two conical surfaces formed on said section of metal tubing conforming to and fitting the conical opening in said table.

6. In a talking machine, the combination of a sound-record-receiving turn-table having a central vertical conical opening formed therein with a motor-driven vertical shaft supporting and driving said table, said shaft having a bearing or support for said table consisting of a section of thin metal tubing having a portion thereof flared outwardly, the conical opening in said turn-table engaging both the flared and a non-flared portion of said section of metal tubing.

7. In a talking machine, the combination of a motor, a vertical shaft driven by the motor, a sound-record receiving table having a central vertical conical opening formed therein, and a tubular sheet metal table support contacting interiorly at points near each end with the upper part of the shaft and exteriorly at points near each end with the surface of the conical opening in the table, a portion of the tube being bent to extend outward from the shaft to provide the said exterior points of contact at one end.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

FRANK L. CAPPS.

Witnesses:

W. S. KERR,

J. S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

APPARATUS FOR TRANSMITTING SOUND
WAVES,

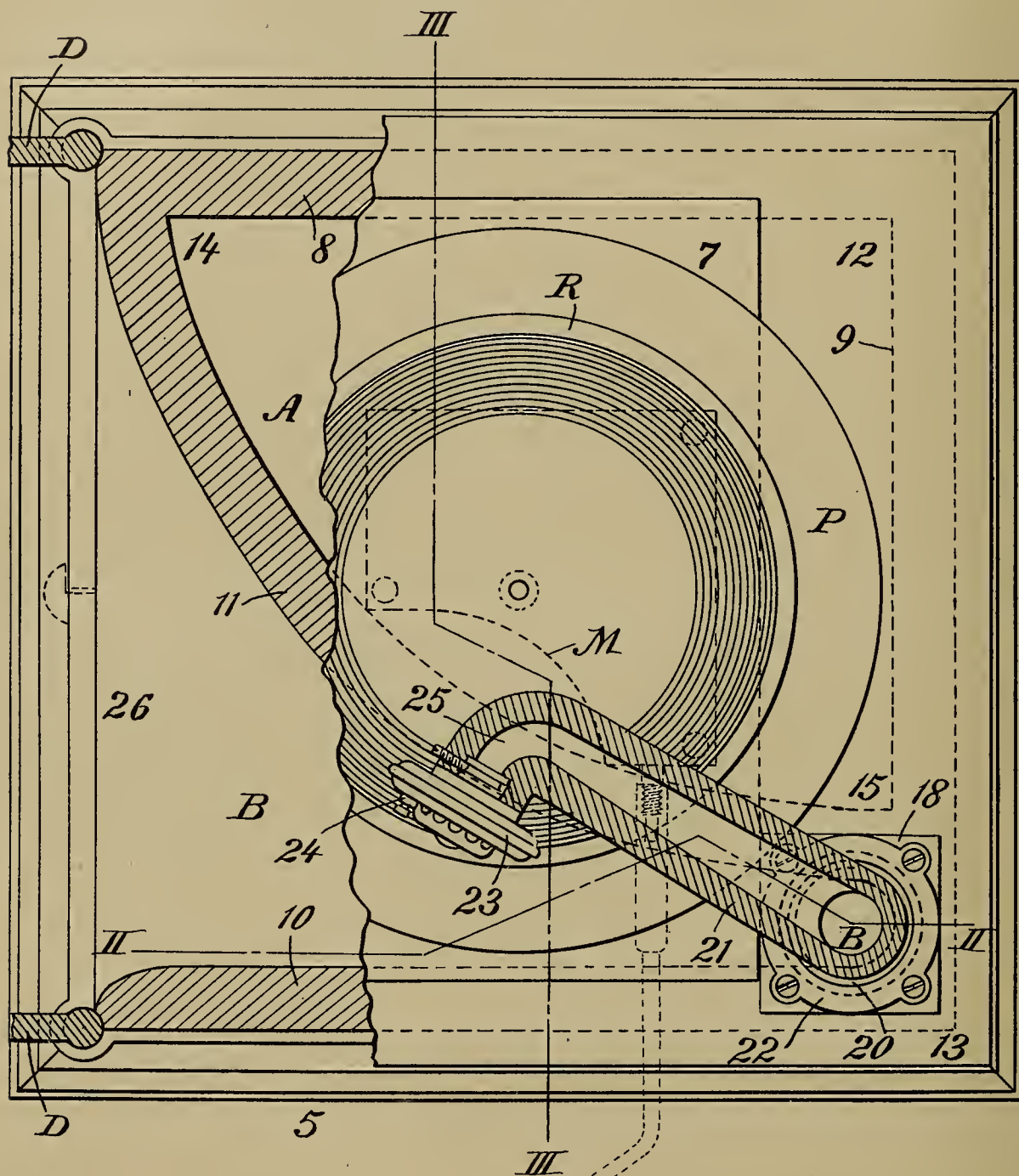
1,181,146-----E. A. Leet,
Patented-May 2nd, 1916.
Filed-Sept. 26, 1912.
Renewed-Sept. 25, 1915.

APPARATUS FOR TRANSMITTING SOUND WAVES.
APPLICATION FILED SEPT. 26, 1912. RENEWED SEPT. 25, 1915.

Patented May 2, 1916.

2 SHEETS—SHEET 1.

FIG.1.

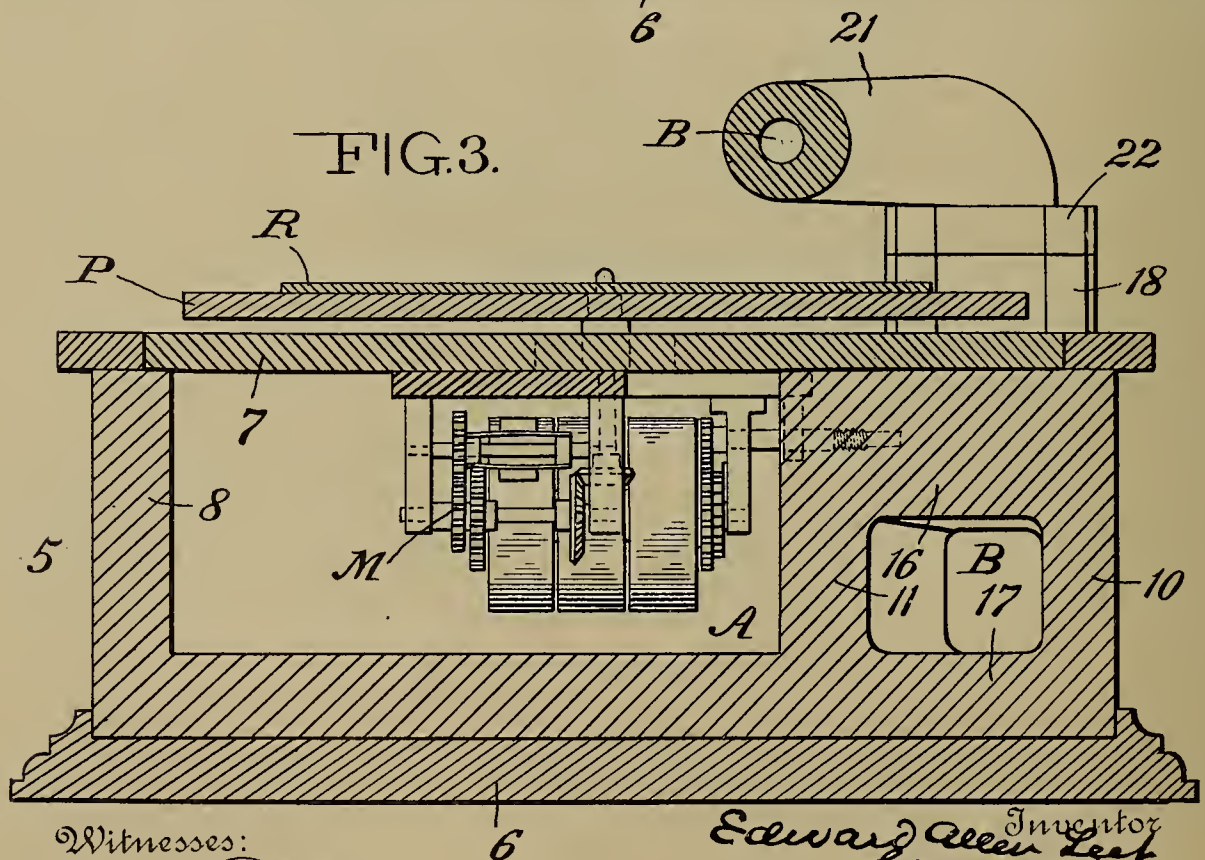


Witnesses:
Lonn Twitchell
Helen E. Koelsch.

Edward Allen Leeb
Inventor.
Geo. H. Benjamin
Attorney

APPARATUS FOR TRANSMITTING SOUND WAVES.
APPLICATION FILED SEPT. 26, 1912. RENEWED SEPT. 25, 1915.

Patented May 2, 1916.
2 SHEETS—SHEET 2.



Witnesses:
Lonn Twitchell
Helen E. Koelsch

Edward Allen Inventor
Geo. Benjamin
Attorney

UNITED STATES PATENT OFFICE.

EDWARD ALLEN LEET, OF NEW YORK, N. Y.

APPARATUS FOR TRANSMITTING SOUND-WAVES.

1,181,146.

Specification of Letters Patent.

Patented May 2, 1916.

Application filed September 26, 1912, Serial No. 722,490. Renewed September 25, 1915. Serial No. 52,705.

To all whom it may concern:

Be it known that I, EDWARD ALLEN LEET, a citizen of the United States, residing at New York city, in the county and State of New York, have invented certain new and useful Improvements in Apparatus for Transmitting Sound-Waves, of which the following is a specification.

My invention relates to a method of and apparatus for transmitting sound waves, and the object of my invention is a device through which sound waves may be transmitted from the sound box to the delivery end of the device without being modified by secondary vibrations set up in the walls or body of the device through which the original vibrations are transmitted.

It is a well known fact that sound waves transmitted through a horn are materially modified by secondary vibrations set up in the walls of the horn or body of the device, and I have observed that where the walls of the horn are made of a suitable material and sufficiently heavy so as to in effect cushion the sound wave but not set up secondary vibrations, that the sounds delivered from the device will be clear and mellow in tone and entirely free from all sounds due to vibrations not originating in the sound box.

I will describe my invention as applied to a phonograph, where the sounds transmitted are amplified. I wish it understood, however, that the same system may be used for concentrating sounds when transmitted to a recording instrument.

The accompanying drawings will serve to illustrate my invention, in which—

Figure 1 is a plan view and partial horizontal section; Fig. 2 a section taken on the line II of Fig. 1; Fig. 3 a section taken on the line III of Fig. 1.

In the drawings, 5 represents a case. This case consists of a bottom 6, a top 7, straight side walls 8, 9 and 10, and curved wall 11. The walls 8 and 9 are joined at 12; 9 and 10 at 13; 8 and 11 at 14; 9 and 11 at 15. By reason of the wall 11, the interior of the case is divided into two spaces, *i. e.*, the space A in which the usual mechanism M for driving the phonographic record is situated, and the space B, which forms part of the sound passage. Mounted upon the top of the case is a circular plate P, adapted to carry a phonographic record R. One side of the case is provided with doors D which may be opened and closed. The space B has a top wall 16,

and a bottom wall 17. One end of the walls 9 and 10 and top and bottom walls 16 and 17, is carried upward to form a projecting portion 18, provided with a concave seat 19 in which is located the lower end 20 of a tube 21. 22 indicates a retaining plate. The concave seat 19, end 20 and retaining plate 22, constitute a ball socket joint. Connected to the opposite end of the tube 21 is a sound box 23, and secured in the sound box is the usual needle or device 24 adapted to pass over the phonographic record R and communicate the vibrations to the sound box, thence from the sound box through the sound passage B to the atmosphere from the outer and larger end of the sound chamber.

It will be observed that the sound passage B is small at the end 25, and large at the end 26. I do not limit myself to the precise shape of the sound passage indicated, as it may be varied in accordance with the general configuration of the case 5.

In constructing the walls of the sound passage, I prefer this should be made of material such as wood, which will be slightly resilient to the impact of the sound waves, but sufficiently thick and heavy to prevent the impact of the sound waves setting up vibrations in the walls of the sound passage. In the drawings I have indicated the walls of the sound passage as of considerable thickness. By experience I have found that the best results are obtained when the sound passage is carved out of a solid block of wood. This block, however, may be built up by gluing or otherwise fastening separate blocks of wood together. I do not limit myself to the use of wood, providing the material employed is, as before stated, slightly resilient to the impact of the sound waves. By experiment I have found that if the walls of the sound passage are slightly resilient, the sounds transmitted are mellow in tone, whereas if the walls are not resilient the sounds are sharp and harsh. So far as I can discover, resiliency in the walls has the effect of producing an intermingling of the original sound vibrations, at least to a sufficient extent to prevent individual vibrations from being separately distinguished in the emitted sounds.

What I wish to have understood as the essence of my invention is, I believe I am the first to recognize the fact that to produce mellowness and pureness of tone, it is essen-

tial that the original sound waves be transmitted through a passage formed of material which shall be slightly resilient to the sound waves, but which will not be affected by the sound waves to set up secondary vibrations, or in other words, that I am the first to produce an instrument which will transmit the original sound waves and deliver them modified only by the cushioning effect of the walls of the sound passage.

Having thus described my invention, I claim:

1. In apparatus for transmitting sound waves, a sound conduit in two sections, one movable relatively to the other, both sections having walls of wood at least one-half inch in thickness throughout their lengths, whereby they are capable of cushioning the origi-

nal sound vibrations without setting up secondary vibrations in their structure. 20

2. In apparatus for transmitting sound waves, the combination with a sound box, of a complete transmitting and amplifying passage extending from the sound box and having throughout its entire length walls of wood at least one-half inch in thickness, whereby the original sound vibrations are not modified by secondary vibrations set up in the structure of said walls. 25

In testimony whereof, I affix my signature in the presence of two witnesses. 30

EDWARD ALLEN LEET.

Witnesses:

HELEN E. KOELSCH,
DONN TWITCHELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

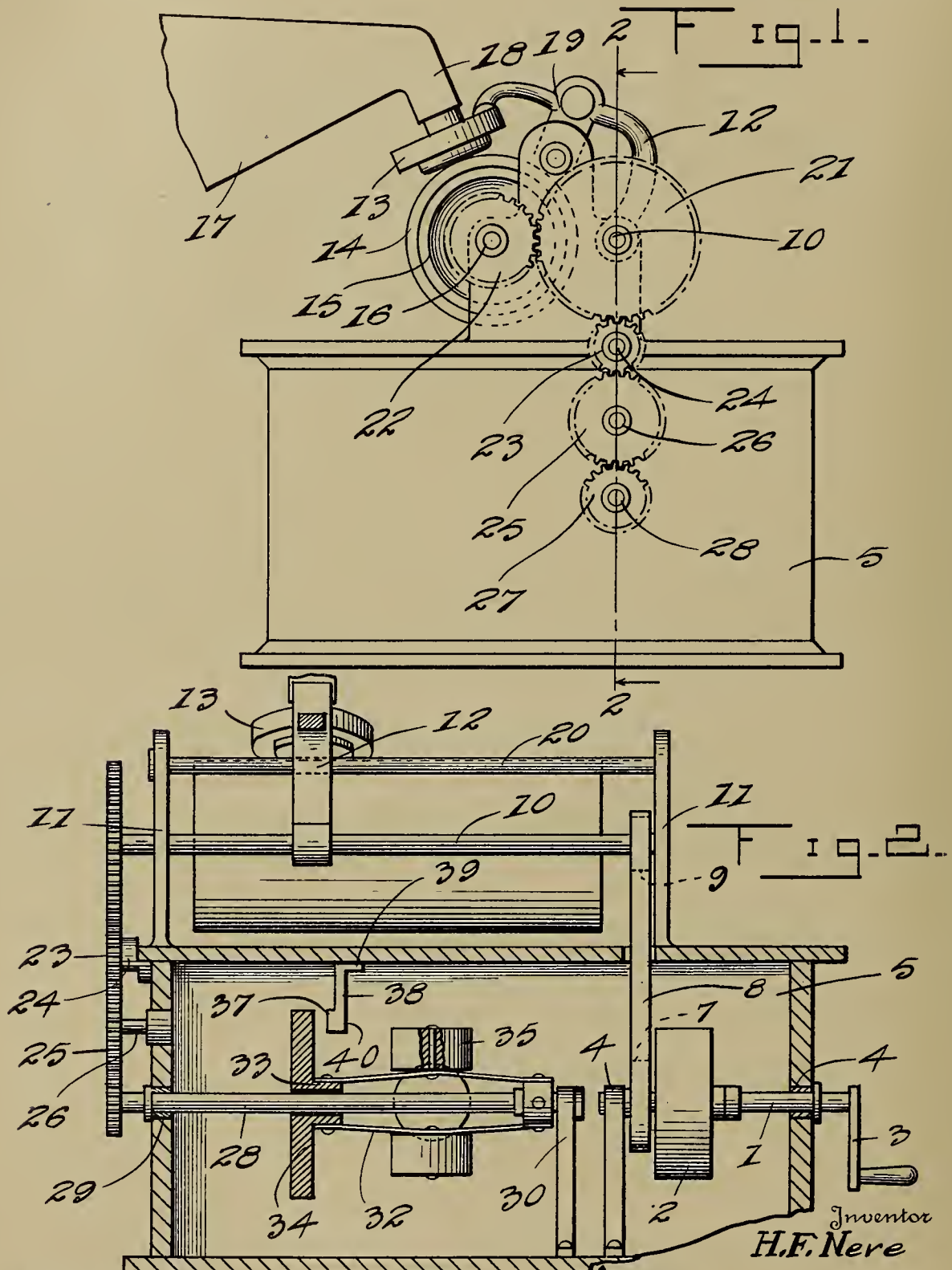
GRAPHOPHONE PATENT.

GEARING FOR PHONOGRAPHS AND
OTHER TALKING MACHINES,
1,181,337-----H. F. Neve,
Patented-May 2nd, 1916.
Filed-March 5th, 1915.

H. F. NEVE.
GEARING FOR PHONOGRAPHS AND OTHER TALKING MACHINES.
APPLICATION FILED MAR. 5, 1915.

1,181,337.

Patented May 2, 1916.



Witnesses
C. R. Bealle.
Wm. S. Fowler.

By *H. F. Neve*
H. F. Neve
Inventor
Attorney

UNITED STATES PATENT OFFICE.

HANS F. NEVE, OF HANCOCK, IOWA.

GEARING FOR PHONOGRAPHS AND OTHER TALKING-MACHINES.

1,181,337.

Specification of Letters Patent.

Patented May 2, 1916.

Application filed March 5, 1915. Serial No. 12,452.

To all whom it may concern:

Be it known that I, HANS F. NEVE, a citizen of the United States, residing at Hancock, in the county of Pottawattamie and State of Iowa, have invented certain new and useful Improvements in Gearings for Phonographs and other Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention comprehends certain new and useful improvements in gearing mechanism for phonographs and the like, and has for its primary object to provide improved and novel gearing between the motor and the governor for controlling the speed of rotation of the cylinder shaft and the horn supporting the feeding shaft.

The invention has for another object to provide improved and novel gearing of the above stated character which will be especially adapted for operating the cylinder shaft and the horn carrying and feeding shaft and automatically controlling the speed of rotation of said shaft.

The invention has for a still further object to provide gearing of the above stated nature in which the governor is mounted upon a shaft independent of the motor shaft and in alinement with the same, a suitable brake disk being carried by the governor for engagement with a brake arm to prevent the shaft of the talking machine from rotating too rapidly.

With these and other objects in view as will become more apparent as the description proceeds, the invention consists in certain novel features of construction, combination and arrangement of parts as will be hereinafter more fully described and claimed.

For a complete understanding of my invention, reference is to be had to the following description and accompanying drawings, in which—

Figure 1 is an end elevation of the principal parts of a talking machine equipped with my improved gearing, parts of the casing being broken away to show parts of the gearing, and Fig. 2 is a longitudinal vertical section through the same with my gearing and the parts to which the gearing is connected shown in elevation, said view

being taken substantially on the plane of line 2—2 of Fig. 1.

Referring in detail to the drawings by numerals, 1 designates the spring motor shaft having a spring motor 2 of conventional form mounted thereon, while a crank arm 3 is mounted upon the outer extended end of said shaft 1. It will be understood that the shaft 1 is mounted in suitable bearings 4 within the casing or body 5 of the phonograph or other talking machine and a belt 8 is engaged around a suitable belt wheel 7 mounted upon the shaft 1 and also around a belt wheel 9 mounted upon the horn carrying and guiding shaft 10, which is mounted in suitable bearings 11 projecting upwardly from the top of the casing or body 5, as will be readily understood by referring to the drawings.

It will be understood that the horn supporting and carrying arm 12 is mounted at its lower end for longitudinal movement upon the shaft 10, while the reproducer 13 is mounted upon the opposite end of the arm 12 for engagement with a cylinder 14 engaged upon the cylinder mandrel 15 mounted upon the cylinder shaft 16. It will also be understood that the horn 17 is secured to the reproducer 13, in any suitable manner, as shown at 18, and a downwardly directed arm 19 is carried by the arm 12 for engagement upon a supporting and guiding shaft 20 between the shafts 10 and 16 and preferably in a plane above the same, as will be readily seen by referring to Fig. 1 of the drawings.

A large gear wheel 21 is mounted upon the shaft 10 and meshes with a gear wheel 22 somewhat smaller in diameter than the gear wheel 21 and mounted upon the cylinder shaft 16. The gear wheel 21 also meshes with an idler or intermediate gear wheel 23 mounted upon a stub shaft 24, which idler gear wheel 23 also meshes with a similar gear wheel 25 and below the same and mounted upon a stub shaft 26, said idler gear wheel 25 being somewhat larger in diameter than the first mentioned idler gear wheel 23. Beneath and meshing with the idler gear wheel 25 is a gear wheel 27 which is mounted upon the governor shaft 28 and the gear wheel 27 is preferably smaller in diameter than the gear wheel 25. The purpose of the difference in diameters of the various gear wheels will be readily apparent, as the

different shafts may be rotated at different speeds.

The governor shaft 28 has one end mounted in a suitable bearing 29 in the end of the casing or body 5, while its opposite end is mounted in a stationary bearing bracket 30 projecting upwardly from the bottom of the body or casing 5 and the governor shaft 28 is preferably in alinement with the motor shaft 1.

Secured to the governor shaft 28, preferably at the inner end thereof, is a collar 31 to which the inner ends of the resilient governor arms 32 are connected, while the outer ends of said governor arms 32 are secured to the circular flange 33 projecting from one side of the brake 34 which is loosely mounted upon the governor shaft 28 a spaced distance from the outer end thereof.

It will be evident that as the speed of rotation of the governor shaft 1 and the shaft of the talking machine increases, the governor arms 32 will move outwardly with the blocks 35 mounted thereon, preferably at the longitudinal center of said arms 32, as shown at 36, by rivets or other suitable securing members. As the speed of rotation of the governor shaft 28 is unduly increased, the inner face of the brake disk 34 will be drawn against the brake face 37 of the stationary depending brake arm 38 which has its upper end turned at right angles, as shown at 39, and secured to the top of the body or casing 5, while the lower end is turned outwardly, as shown at 40, and provided with the brake face 37, previously mentioned. This frictional engagement of the brake disk 34 with the brake face 37 of the brake arm 38 will immediately decrease the speed of rotation of the governor shaft 28 and likewise cause a decrease in the speed of rotation of the

various shafts of the talking machine connected with the governor shaft 28 by the gears 21, 23, 25 and 27. It will also be evident that the speed of rotation of the motor shaft 1 will be controlled by the governor on the governor shaft 28.

While I have shown and described the preferred embodiment of my invention, it will be understood that minor changes in the details of construction, combination, and arrangement of parts may be made without departing from the spirit and scope of the invention as claimed or sacrificing any of the advantages thereof.

What is claimed is:—

In a talking machine, a casing, a drive shaft mounted in said casing, a motor for driving said drive shaft, a horn supporting and feeding shaft mounted on the top of the casing, connections between the motor shaft and the horn supporting and driving shaft, a cylinder shaft, gear wheels on the ends of the horn and driving shaft and the cylinder shaft, said gears meshing with one another, a stub shaft journaled in one side of the casing, a gear on the end of said stub shaft, a governor shaft, a governor mounted upon the governor shaft for controlling the speed of rotation of said shaft, a gear on the end of the governor shaft for meshing with the gear of the stub shaft, said stub shaft gear meshing with the gear of the horn supporting shaft and means for controlling the same.

In testimony whereof I affix my signature in presence of two witnesses.

HANS F. NEVE.

Witnesses:

DAVID LERETTE,
FRED J. BOIE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE,
1,181,655-----J. C. English,
Patented--May 2nd, 1916.
Filed--May 29th, 1909.
Renewed-Sept. 24th, 1914.

J. C. ENGLISH.
TALKING MACHINE.

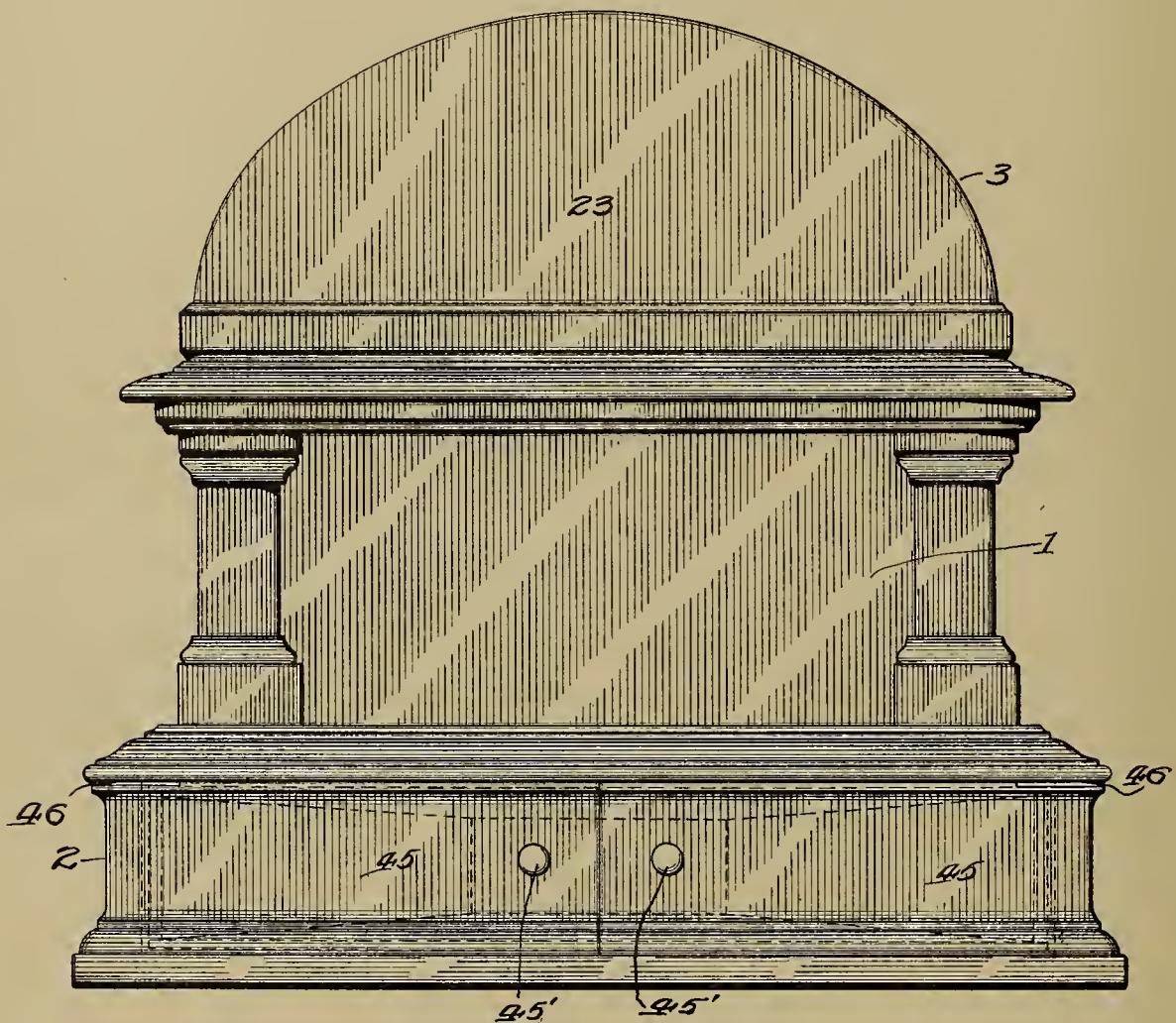
APPLICATION FILED MAY 29, 1909. RENEWED SEPT. 24, 1914.

1,181,655.

Patented May 2, 1916.

6 SHEETS—SHEET 1.

Fig. 1.



INVENTOR

John C. English.

WITNESSES

F. J. Hartmann.

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Horace Pettit.

ATTORNEY

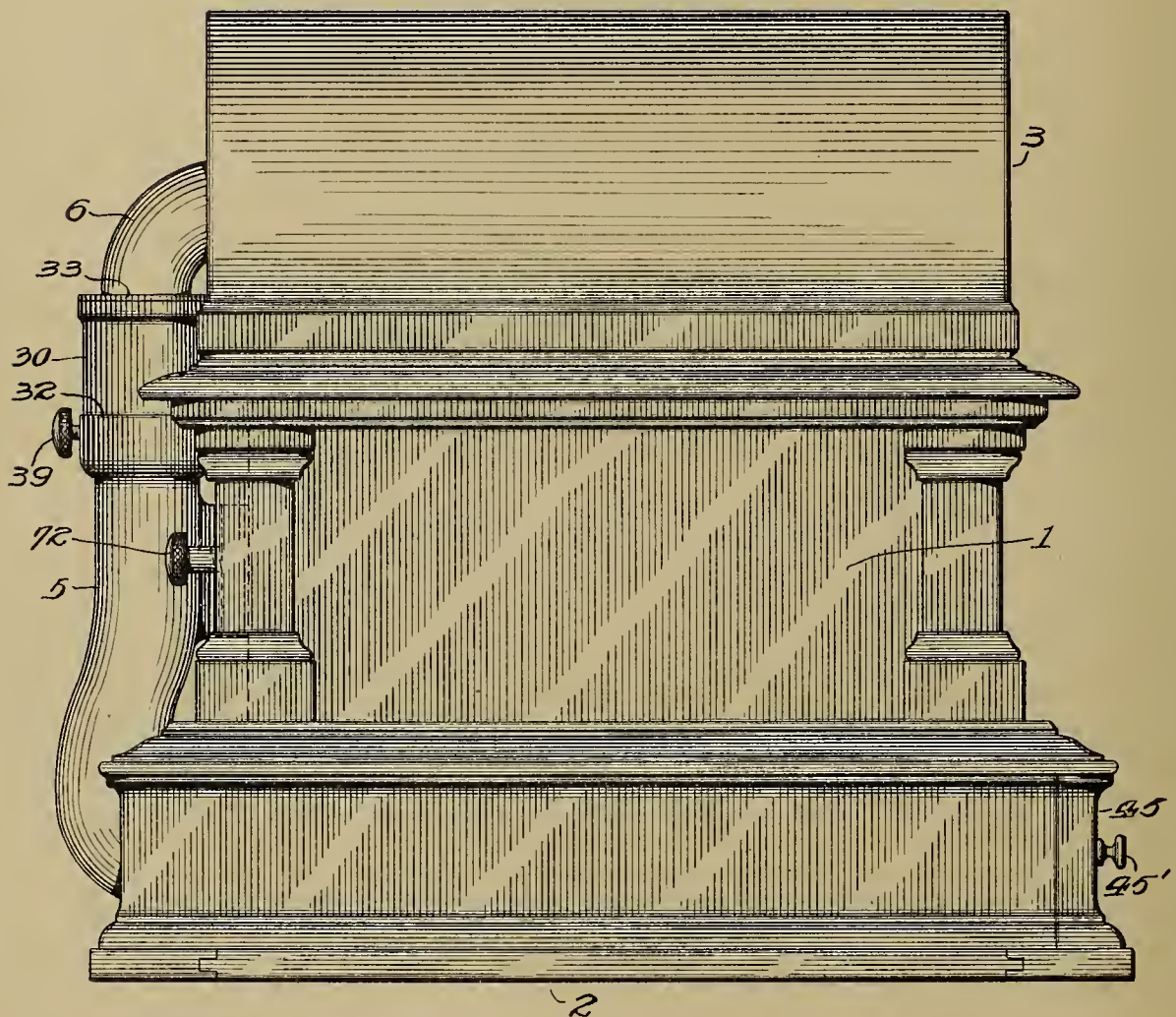
J. C. ENGLISH.
TALKING MACHINE.

APPLICATION FILED MAY 29, 1909. RENEWED SEPT. 24, 1914.

1,181,655.

Patented May 2, 1916.
6 SHEETS—SHEET 2.

Fig. 2.



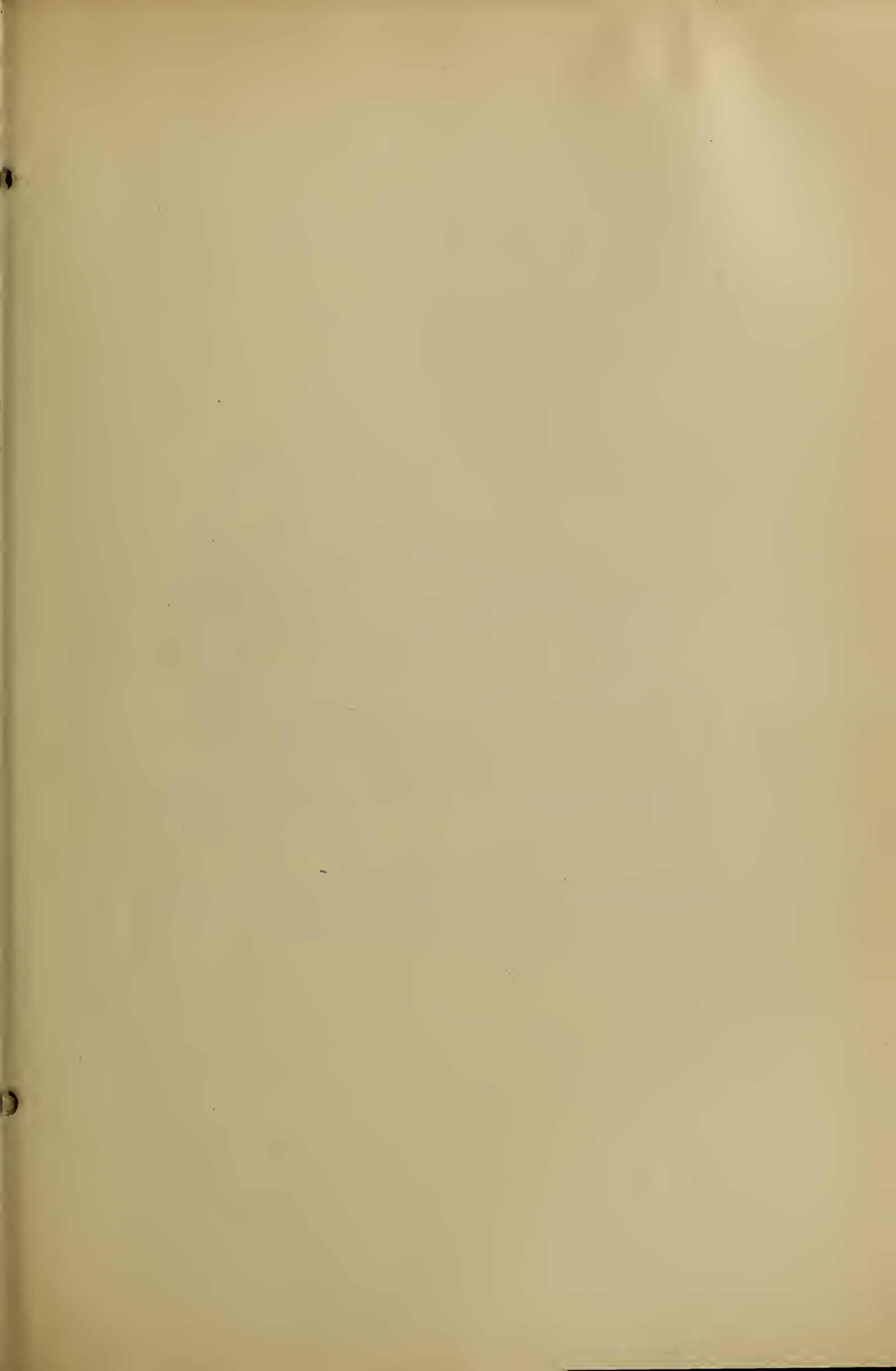
WITNESSES

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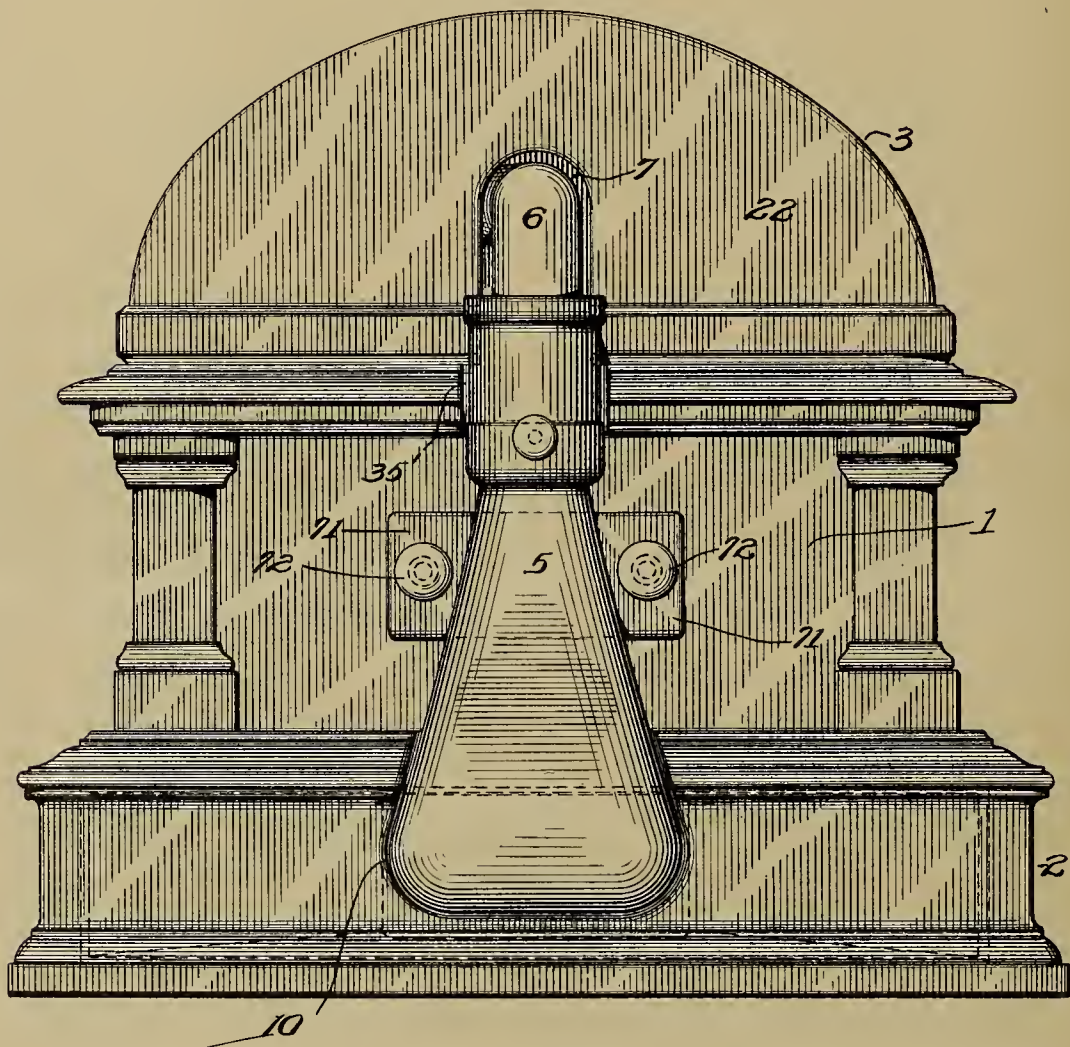
J. C. ENGLISH.
TALKING MACHINE.

APPLICATION FILED MAY 29, 1909. RENEWED SEPT. 24, 1914.

1,181,655.

Patented May 2, 1916.
6 SHEETS—SHEET 3.

Fig. 3.



WITNESSES

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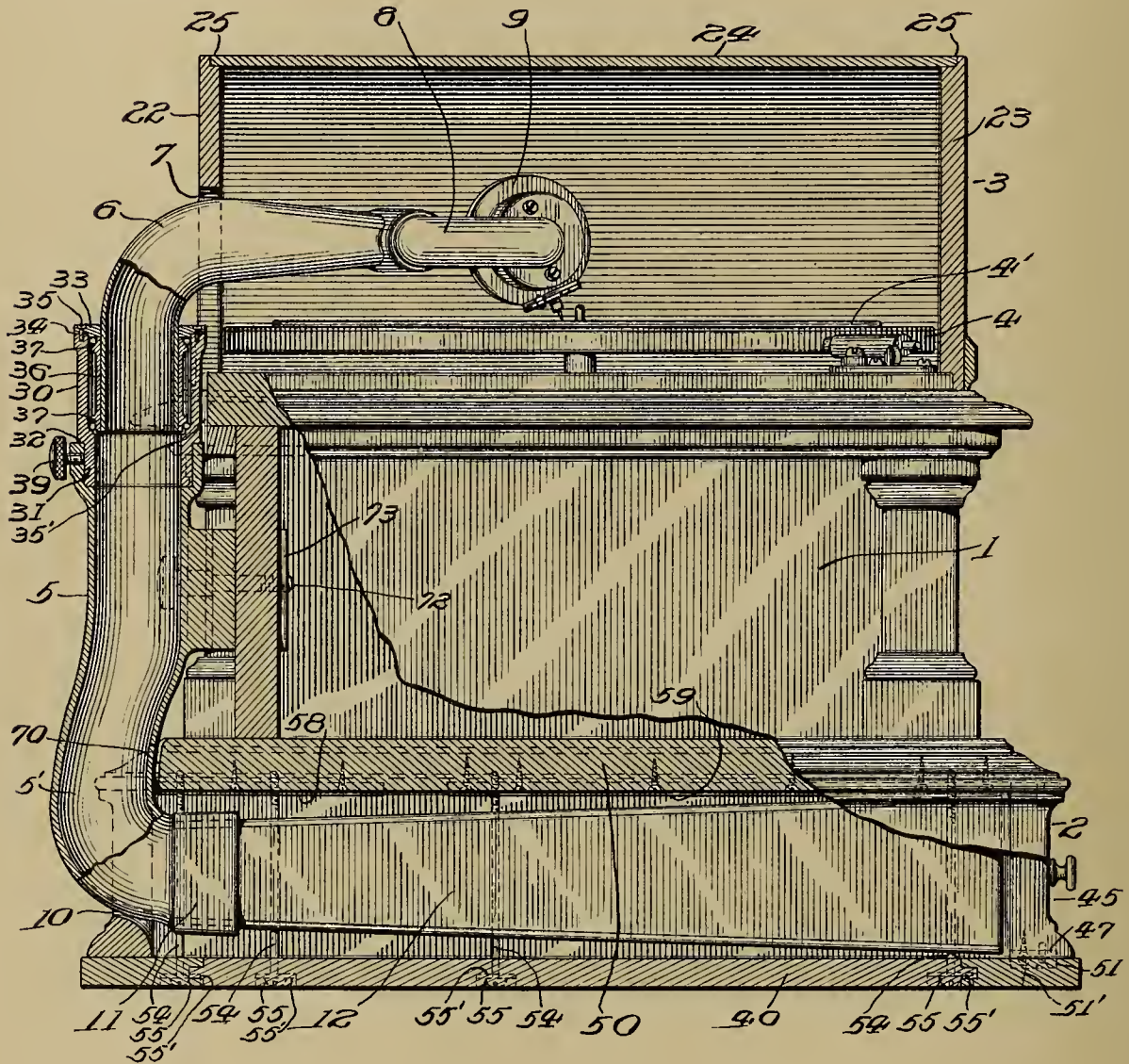
APPLICATION FILED MAY 29, 1909. RENEWED SEPT. 24, 1914.

1,181,655.

Patented May 2, 1916.

6 SHEETS—SHEET 4.

Fig. 4.



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TALKING MACHINE.

APPLICATION FILED MAY 29, 1909. RENEWED SEPT. 24, 1914.

1,181,655.

Patented May 2, 1916.

6 SHEETS—SHEET 5.

Fig. 5.

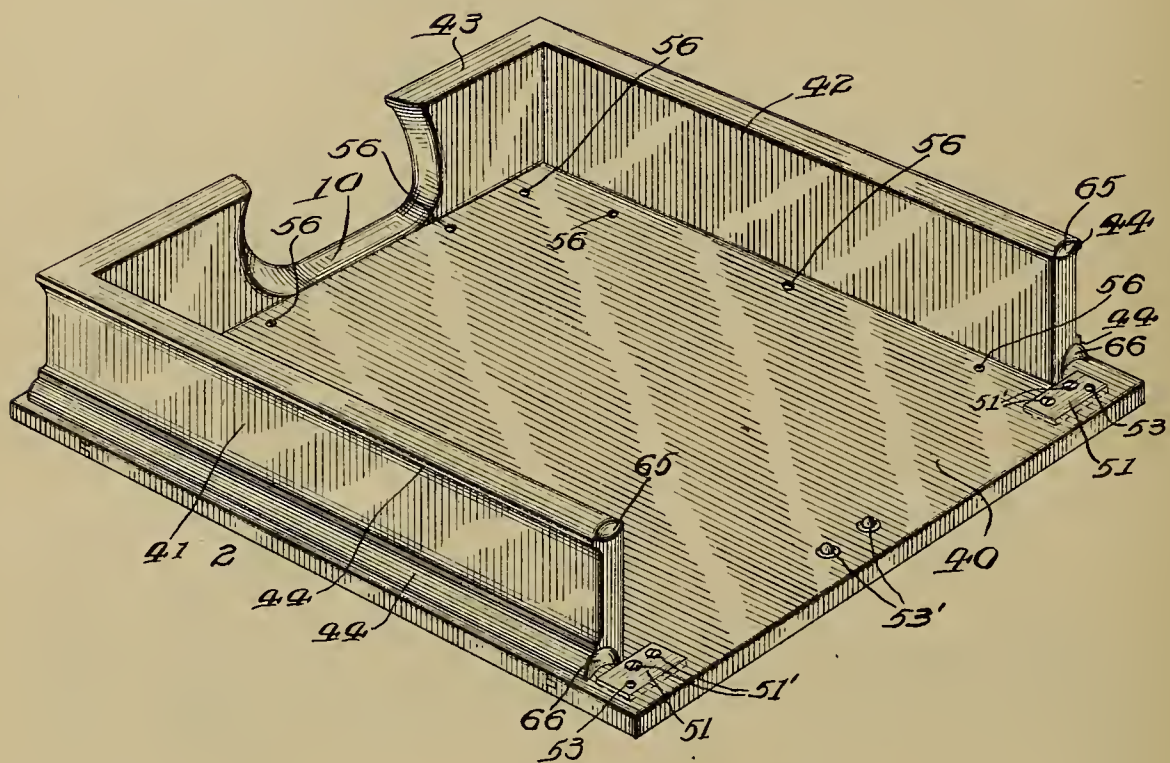
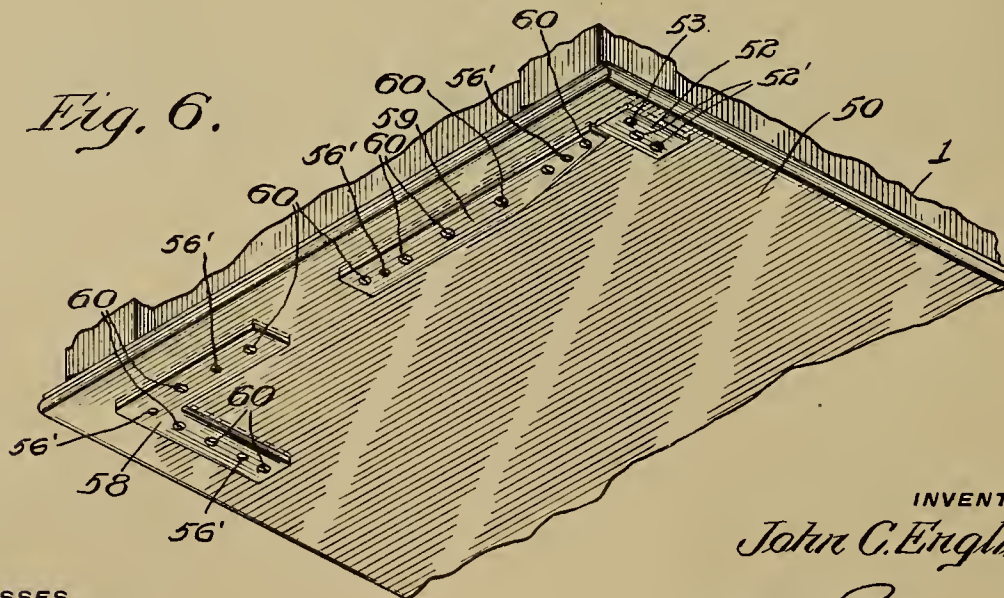


Fig. 6.



WITNESSES

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TALKING MACHINE.

APPLICATION FILED MAY 29, 1909. RENEWED SEPT. 24, 1914.

1,181,655.

Patented May 2, 1916.

6 SHEETS—SHEET 6.

Fig. 7.

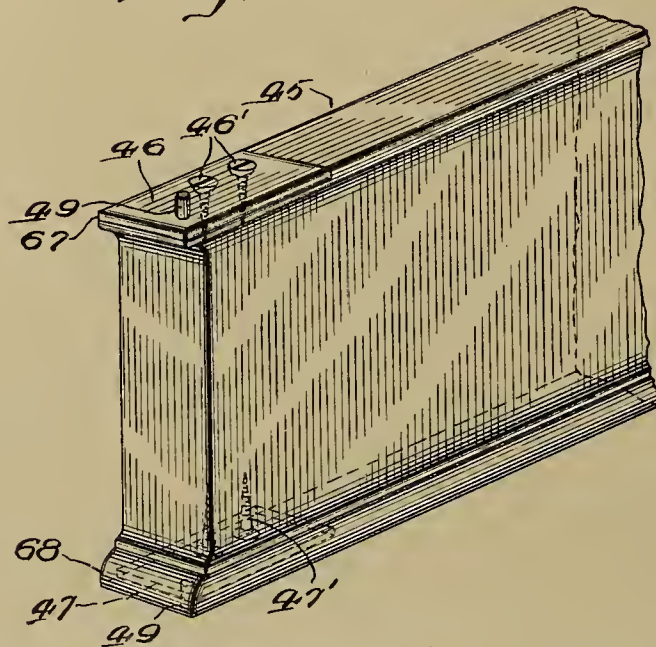


Fig. 8.

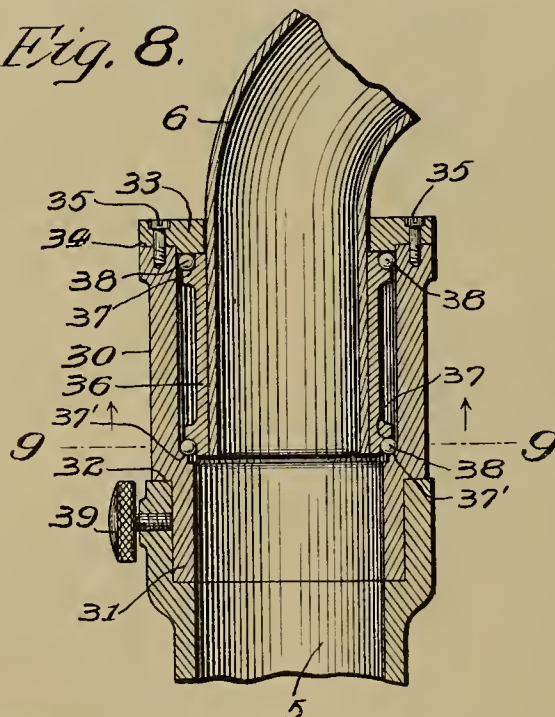
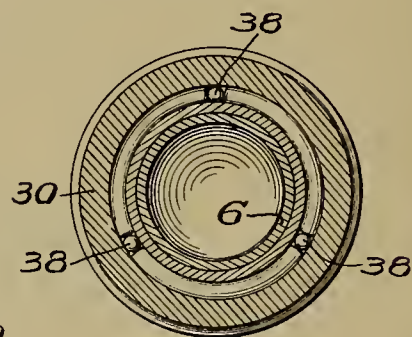


Fig. 9.



WITNESSES

H. G. Hartman.
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John C. English
Home Petry.

INVENTOR

ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,181,655.

Specification of Letters Patent.

Patented May 2, 1916.

Application filed May 29, 1909, Serial No. 499,080. Renewed September 24, 1914. Serial No. 863,387.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

The main objects of this invention are to provide a compact, strong and durable talking machine of artistic appearance having an inclosed amplifier; to provide an inclosed talking machine having a casing which may be readily taken apart for repairs or transportation; to provide a talking machine having a record support, a radial sound box arm and a sound box carried thereby and provided with a removable cover for inclosing the record support, the sound box and a portion of the radial arm; to provide a talking machine having a casing, a hollow bracket fixed upon the outside of the casing, a sound box arm and sound box carried over the casing by the bracket, an amplifier carried by the bracket in the base of the casing, and a removable cover over the sound box and a portion of the sound box arm; to provide an improved door construction for talking machines; to provide an improved anti-friction mounting for a radial sound box arm; and to provide other improvements as will appear hereinafter.

In the accompanying drawings Figure 1 is a front elevation of a talking machine constructed in accordance with this invention; Fig. 2 a side elevation of the same; Fig. 3 a rear elevation of the same; Fig. 4 a side elevation of the same partly in longitudinal vertical section; Fig. 5 a top perspective view of a portion of the same; Fig. 6 a fragmentary bottom perspective view of a portion of the same immediately above the portion shown in Fig. 5; Fig. 7 a fragmentary perspective view of one of the doors of the same; Fig. 8 a vertical section of the anti-friction mounting of the radial sound box arm; Fig. 9 a transverse section on line 9—9 of Fig. 8.

Referring to the drawings, which show a single embodiment of this invention, the device comprises a casing or cabinet consisting of a body or main portion 1 mounted upon a removable base portion 2, the top of the body being provided with a removable cover 3. Mounted upon the main portion 1

of the casing is the usual turntable 4 for supporting a disk record 4' and within the main portion 1 of the casing is the usual motor (not shown) for actuating the turntable. Outside of the casing and rigidly secured to the rear side thereof is a hollow upwardly extending bracket 5, rotatably mounted in the upper cylindrical end of which is a radial sound box arm 6, extending inwardly through an arched recess 7 in the lower edge of the rear end of the cover 3, and over the top of the turntable 4, and carrying connected to its inner or free end, by means of the usual U-shaped tube 8, the usual sound box 9.

The bracket 5 flares downwardly and the opening 5' through the bracket increases constantly in area downwardly and the lower end of the bracket 5 projects through an opening 10, provided therefor in the base of the casing, and terminates within the base adjacent the opening in a rectangular, oblong, horizontally arranged socket 11, in which is rigidly mounted one end of a transversely rectangular amplifier 12, which is entirely supported by the bracket 5, and which terminates at its free end adjacent the front of the base of the casing, the bracket and the amplifier being entirely free from contact with the base of the casing. Wax or other suitable material may be applied in the joint between the amplifier and the bracket to seal the joint and to hold the amplifier securely in position. The ends 22 and 23 of the cover 3 of the cabinet have substantially straight lower edges and curved upper edges making the ends substantially semi-elliptical in shape, and the top 24 of the cover is curved to bring the upper surface of the top flush with the ends, the upper inner edges of the ends being recessed as at 25 to receive the ends of the top. The height of the top is sufficient to permit the sound box to be inverted and to rest when in inoperative position upon the upper part of the sound box arm as is usual. The dimensions of the cover and of the aperture in the rear end of the cover are such that the cover may be left in position if preferred, while the machine is being operated.

For rotatably supporting the radial sound box arm 6, the upper end of the hollow bracket 5 is substantially cylindrical in shape and is enlarged externally and provided internally with an annular recess ex-

tending from the top of the bracket a short distance downwardly in the enlarged portion of the bracket forming a socket in which telescopes a substantially cylindrical hollow head or casing 30, the lower end of the head being provided with an external annular recess to form a cylindrical neck 31, fitting in the bracket, and an annular shoulder 32, resting against the upper end of the bracket. The upper end of the head 30, is closed by an annular cover 33, the under surface of which is provided with an annular peripheral recess 34, to receive the upper end of the head and the cover is held in place by screws 35, through the cover and threaded into the head. The rear edge of the upper portion of the body of the cabinet is preferably recessed as at 35' to receive the inner side of the head 30 and the inner side of the upper end of the bracket 5.

The outer or larger end of the taper arm 6 is substantially cylindrical and fits snugly but rotatably through the central opening of the cover 33 and extends downwardly in the head. The portion of the arm 6 within the head is surrounded by a sleeve 36, rigidly secured to the arm by any suitable means, and is enlarged at each end and provided at each end with an annular groove 37, coaxial therewith to form bearings for anti-friction balls 38. The interior of the head 30 is enlarged to receive the sleeve and to form bearings 37', opposite the bearings 37 of the sleeve, the oppositely disposed bearings forming annular race ways to hold the balls 38 in place. The balls surrounding the upper end of the sleeve rest in the angle between the side and cover of the head, and the balls surrounding the lower end of the sleeve rest in the annular groove 37', between the lower portion and the upper enlarged portion of the head. The balls in each raceway are separated by means of segmental space bars, round in cross section and of less diameter than the balls, loosely mounted in the raceway. Preferably but three balls are used in each raceway, the balls being equispaced and each ball being separated from the adjacent ball by means of one of the segmental space bars, forming a three-point bearing or support in each raceway, for the sound box arm, the advantages of which are obvious. The head is held in a fixed position in the hollow bracket 5 by means of a thumb screw 39, and may be readily removed from the bracket by loosening the screw.

The base of the cabinet projects outwardly from each side of the main portion 1 of the cabinet, so as to permit of the use of a relatively large amplifier within the base, and the base comprises a bottom member 40, two side members 41—42, and an end member 43 rigidly secured together.

The end member is recessed as at 10, as here-

tofore described, to receive the lower end of the hollow bracket 5, and the side members 41 and 42 extend from the end member toward the front of the machine and terminate a short distance from the front edge of the bottom member 40. The upper and lower edges of the outer surfaces of the sides 41 and 42 are provided with moldings 44, integral therewith to increase the rigidity of the sides and to add to the ornamental effect of the casing.

The front of the base of the cabinet is formed by the two doors 45, the top upper edges being flush with the upper edges of the sides 41 and 42 of the base, the outer ends of the doors being flush with the side surfaces of the sides of the base, and the inner ends of the doors meeting centrally of the front of the cabinet. Each of these doors is provided with a knob 45' and upon its upper edge at its outer end with a plate 46, set into a recess provided therefor in the door and held in position by means of screws 46', the upper surface and the side edges and the outer end edge of the plate being flush with the corresponding surfaces of the door. The lower edge of each door is provided with a corresponding plate 47 fixed in the recess provided therefor in the door and held in position by screws 47'. Each of these plates is provided with a vertically projecting pintle 49 rigid therewith, the two pintles upon each door being in vertical alinement.

For holding the doors rotatably in position between the bottom member 40 of the base and the bottom member 50 of the main portion of the cabinet, a plate 51 is set into a recess provided therefor in the upper surface of the bottom member 40 of the base in front of the end of each of the side members 41 and 42, and held in position by means of screws 51' and a corresponding plate 52 is set into the lower surface of the bottom member 50 of the main portion of the cabinet, opposite each plate 51 and held in position by means of screws 52'. Between each pair of these plates in the bottom members of the cabinet is mounted one of the doors 45, the pintles of the door engaging rotatably in apertures 53 provided therefor in the plates. Spring catches 53' are mounted in the upper side of the bottom 40 of the base to hold the doors when closed.

For detachably securing the base of the cabinet to the main portion thereof bolts 54, preferably having round slotted heads 55, are passed through washers 55', apertures 56 provided therefor in the bottom member of the base and are threaded into apertures 56' in plates 58 and 59 secured to the under surface of the bottom member 50 of the main portion of the cabinet by means of screws 60, the washers and heads of the bolts fitting in recesses provided therefor in

the under surface of the base. These latter plates 58 and 59 project downwardly from the under surface of the main portion of the cabinet and are arranged within and in contact laterally with the inner surfaces of the sides and rear end of the base of the cabinet to hold the sides and end of the base rigid and to facilitate the adjustment of the base in attaching and detaching it from the main portion of the cabinet. Two of these plates 58 are each substantially L-shaped and are arranged to engage one in each rear corner of the base, while the remaining two plates 59 are arranged one upon each side of the cabinet to engage against the inner surfaces of the sides of the base. The axis of rotation of each door is substantially in alinement with the outer flat surface of the adjacent side of the base, and the ends of the sides of the base are recessed at top and bottom as at 65 and 66 to receive the projecting portions 67 and 68 of the end of the adjacent door when the door is opened.

For compactness, the projecting rear edge of the bottom 50 of the main portion of the cabinet is recessed as at 70 to receive the downwardly projecting portion of the hollow bracket 5, and the hollow bracket is curved inwardly above this projecting portion 50 and toward the rear side of the cabinet to which it is secured by means of a base plate 71, integral with the bracket and projecting laterally upon opposite sides thereof, and which is detachably fastened to the back of the cabinet by means of thumb screws 72, which pass through apertures provided therefor in the base plate 71 and the back of the cabinet and are threaded into a plate 73 upon the inside of the cabinet.

Although only one form has been described in which this invention may be embodied, it is obvious that many changes might be made in the construction set forth without departing from the spirit of this invention or the scope of the appended claims.

Having thus described the invention, I claim and desire to protect by Letters Patent of the United States:—

1. In a talking machine, the combination with a cabinet comprising a body portion and a portion arranged below said body

portion and projecting laterally therefrom, of an upwardly extending hollow bracket secured to said cabinet and extending outside thereof close to and generally conforming to the outline of said cabinet, and having a lower portion projecting through an aperture therefor in one side of and in the top of said laterally projecting portion, and sound reproducing means communicating with said bracket.

2. In a talking machine the combination with a cabinet comprising a main portion for containing a motor and a base having a portion projecting laterally from said main portion, of a hollow bracket rigidly secured to the exterior of said cabinet and projecting through an aperture therefor in one side of said base and the top of said laterally projecting portion thereof, and an amplifier in said base communicating with said bracket.

3. In a talking machine the combination with a cabinet comprising a main portion for containing a motor, and a base having a portion projecting laterally from said main portion, of a hollow bracket rigidly secured to the exterior of said cabinet and projecting through an aperture provided therefor in one side of said base and the top of the said laterally projecting portion thereof, and an amplifier in said base wholly supported by and communicating with said bracket.

4. In a talking machine the combination with a cabinet comprising a main portion for containing a motor, and a base having a portion projecting laterally from said main portion, of a hollow bracket rigidly secured to the exterior of said cabinet and projecting through an aperture provided therefor in one side of said base and the top of the said laterally projecting portion thereof, and an amplifier in said base carried by and communicating with said bracket, and said amplifier being entirely out of contact with said cabinet.

In witness whereof I have hereunto set my hand this 27th day of May, A. D. 1909.

JOHN C. ENGLISH.

Witnesses:

EDWARD KARCHER MACÉWAN,
FRANK BARCLAY MIDDLETON, Jr.

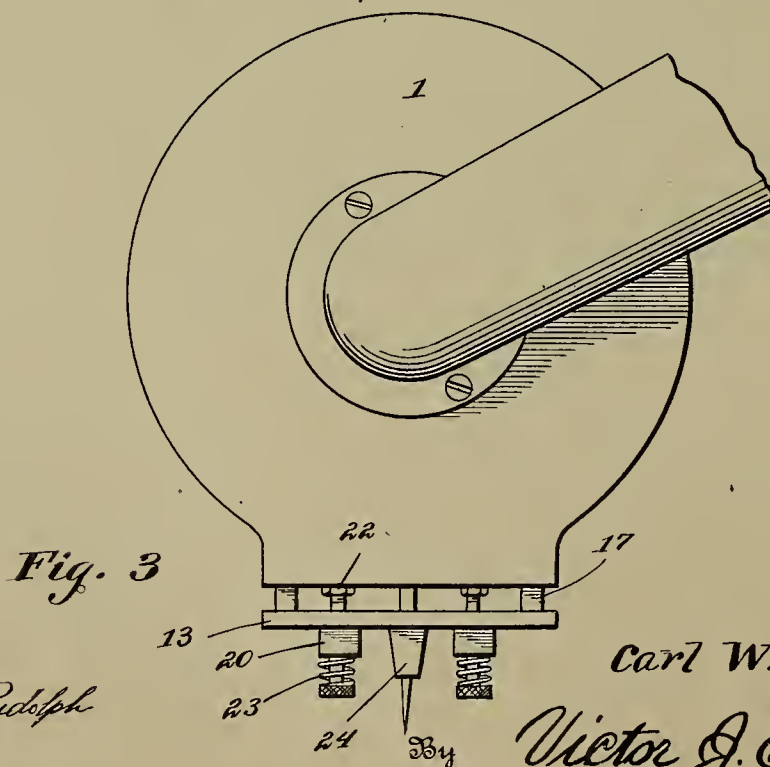
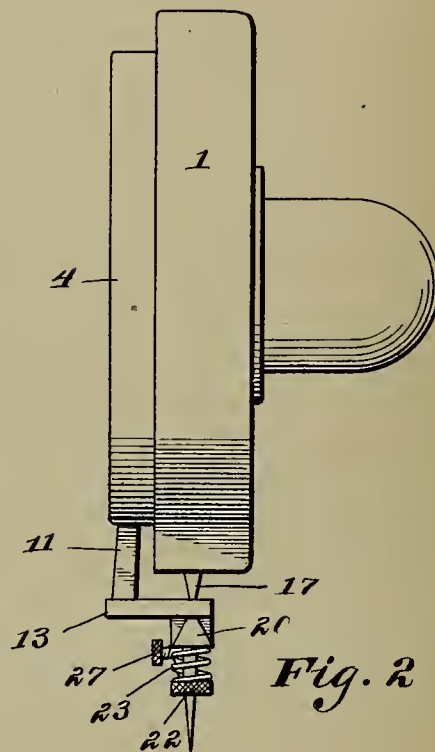
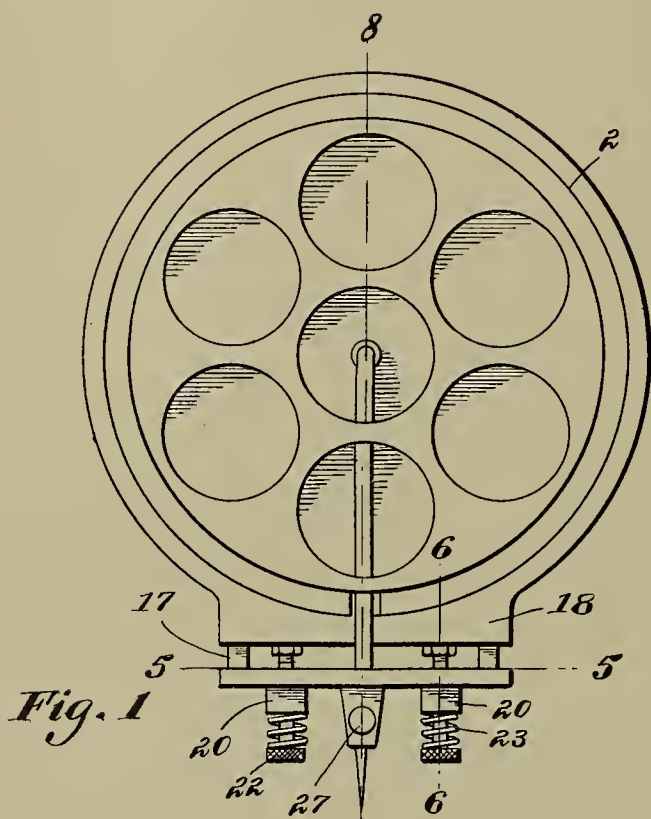
GRAPHOPHONE PATENT.

SOUND REPRODUCER,
1,181,864-----C. W. Eilers,
Patented-May 2nd, 1916.
Filed-August 28th, 1915.

C. W. EILERS.
SOUND REPRODUCER.
APPLICATION FILED AUG. 28, 1915.

1,181,864.

Patented May 2, 1916.
2 SHEETS—SHEET 1.



Witness
C. P. Rudolph

Inventor

Carl W. Eilers,

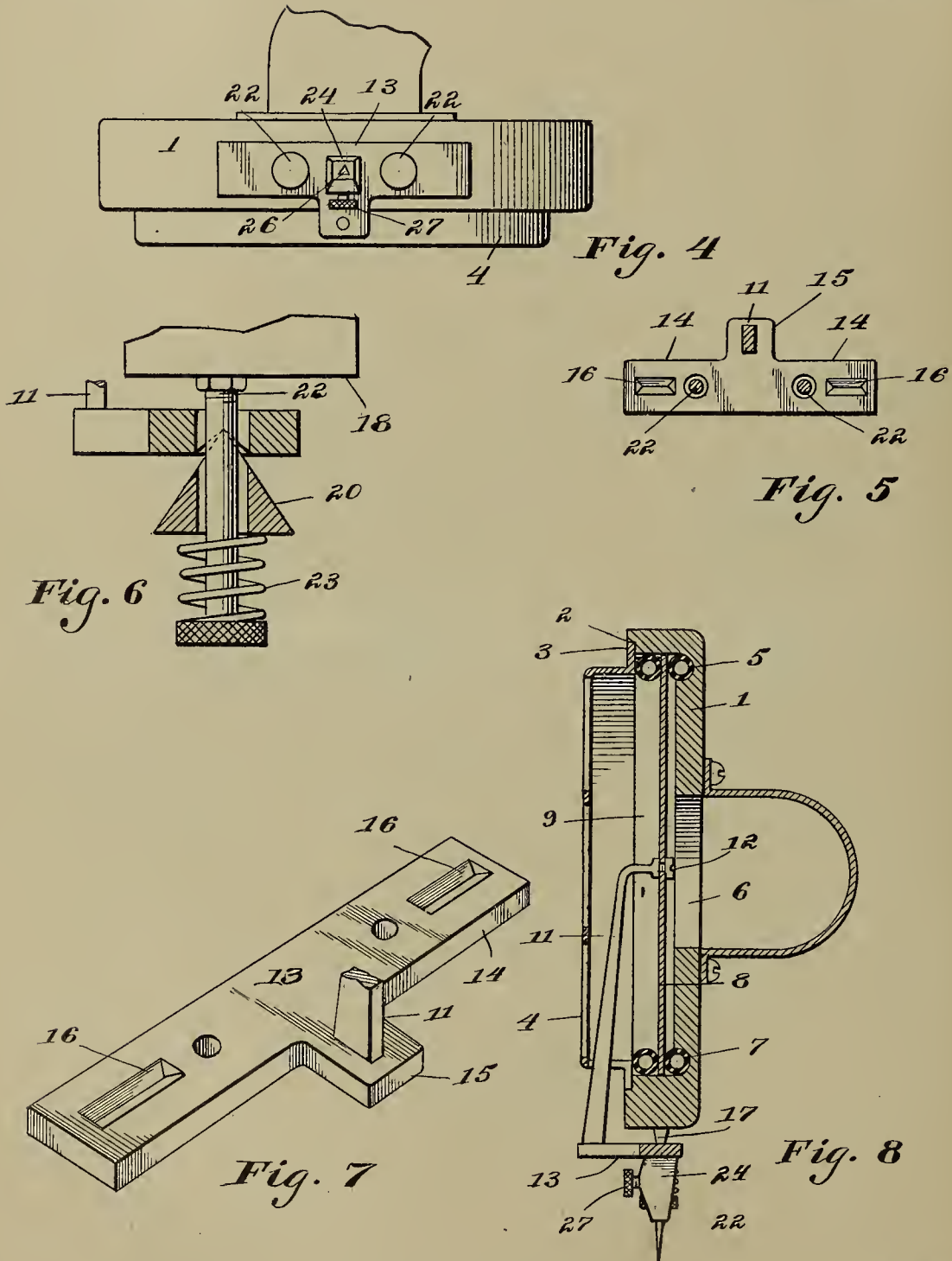
Victor J. Evans

Attorney

C. W. EILERS.
SOUND REPRODUCER.
APPLICATION FILED AUG. 28, 1915.

1,181,864.

Patented May 2, 1916.
2 SHEETS—SHEET 2.



Witness
C. F. Rudolph

Inventor
Carl W. Eilers,
By Victor J. Evans
Attorney

UNITED STATES PATENT OFFICE.

CARL W. EILERS, OF EAST ST. LOUIS, ILLINOIS.

SOUND-REPRODUCER.

1,181,864.

Specification of Letters Patent.

Patented May 2, 1916.

Application filed August 28, 1915. Serial No. 47,844.

To all whom it may concern:

Be it known that I, CARL W. EILERS, a citizen of the United States, residing at East St. Louis, in the county of St. Clair and State of Illinois, have invented new and useful Improvements in Sound-Reproducers, of which the following is a specification.

This invention relates to sound reproducers and more particularly to means for attaching the needle arm to the casing and has for its primary object the provision of a connection between the needle arm and the casing whereby the needle arm can freely vibrate.

Another object of the invention is the arrangement of the parts whereby the action of the lever can be accomplished for increasing the action of the needle arm upon the diaphragm without materially effecting the pressure between the needle and the indentation in the record.

A further object of the invention is the provision of wedge-shaped bearings whereby the plate and needle arm are allowed to rock with a minimum amount of friction.

A still further object of the invention is the arrangement of the needle arm intermediate the wedge-shaped bearings and the needle-receiving socket.

The invention consists in the features of construction, combination and arrangement of parts, hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a front elevation of my improved form of reproducer. Fig. 2 is a side elevation thereof. Fig. 3 is a rear view with the tone arm in section. Fig. 4 is a bottom plan view. Fig. 5 is a horizontal section on line 5—5 of Fig. 1. Fig. 6 is a section on line 6—6 of Fig. 1. Fig. 7 is a perspective view of the plate. Fig. 8 is a vertical section on line 8—8 of Fig. 1.

In the drawings, the numeral 1 designates the casing of the reproducer and as shown is provided with the usual peripheral flange 2 provided with an annular shoulder 3 that receives the peripheral edge portion of a perforated cover 4. The casing is further provided with an annular semi-circular depression 5 arranged concentrically of the usual tone arm opening 6.

Seated in the depression 5 is a hollow rubber ring 7 upon which rests the diaphragm 8. Abutting the outer surface of the diaphragm and arranged in parallelism

with the first ring is a second hollow ring 9 over which passes the needle arm 11 shown in my improved reproducer as lying in close proximity to the side of the diaphragm, attachment being made to the central portion of the diaphragm by means of a screw 12. In any suitable manner, the lower remaining extremity of the needle arm is secured to a T-shaped plate 13, but I wish it to be understood that the needle arm, if found advantageous, can be formed integral with the T-shaped plate. The connection between the plate and the needle arm is made at a central point in a longitudinal direction, so that the arms 14 will project equally from opposite sides of the needle arm, while the center of the arm 15 will intersect the axis of the needle arm. The arms 14 are provided with depressions 16 in which seat the edges of wedge-shaped bearing blocks or projections 17 that are secured to the boss 18 of the casing in any suitable manner. The under surface of the plate is provided with depressions 19 corresponding to the heretofore mentioned depressions 16 and as shown receive the edges of a second set of wedge shaped blocks 20 provided with passages 21. The said depressions 16 and 19 have all of their walls extending at an incline to the top and bottom surfaces of said plate.

Passing through the passages 21 are the threaded shanks of bolts 22 having threaded engagement with the boss 18. Encircling that portion of each bolt between the block 20 and the bolt head is a coil spring 23, the tension of which being utilized to yieldably force the plate in contact with the bearing block 17 and to yieldably force the blocks 20 into engagement with the plate. By this arrangement, it will be seen that the plate is free to rock with a minimum amount of friction. The arm 13 has secured thereto the shank 24 formed with a needle holder having a triangular-shaped bore 26 that is intersected by the axis of a binding screw 27 threaded into the socket.

By referring to Fig. 8 it will be seen that the axis of the socket is in vertical alignment with the diaphragm 8.

From the foregoing description, it will be seen that, owing to the fact that the fulcrum point of the plate is disposed to one side of the needle arm while the needle receiving socket is disposed to the opposite side of the needle arm, a slight pressure upon the needle within the socket will cause

an increased pressure to act upon the center of the diaphragm through the needle arm.

Having described the invention, what is claimed is:

1. Means for securing the needle arm to the sound reproducer comprising a T-shaped plate secured to one extremity of said needle arm, a needle receiving socket secured to an intermediate portion thereof, wedge shaped blocks secured to said casing and abutting the remaining extremities of said plate, threaded bolts passing through said plate and threaded into said casing, a second set of wedge-shaped blocks encircling said bolts and pressing against said plate, and coil springs encircling the shanks of said bolts between their heads and said second set of blocks.

2. Means for attaching the needle arm to the casing of a sound reproducer comprising a plate secured to said needle arm and provided with wedge-shaped depressions, wedge-shaped bearing blocks secured to said casing and seated in certain of said depressions, screws passing through said plate and threaded into said casing, other wedged shaped bearing blocks seated in the remaining depressions, and slidable on said screws and springs encircling said screws and bearing upon said second bearing blocks at all times.

In testimony whereof I affix my signature in presence of two witnesses.

CARL W. EILERS.

Witnesses:

CHAS. G. DROUTH,
H. H. SECHLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPHOPHONE PATENT.

SOUND BOX DIAPHRAGM,
1,182,078-----J. H. Elfering,
Patented-May 9th, 1916.
Filed-November 12th, 1910.

J. H. ELFERING.
SOUND BOX DIAPHRAGM.
APPLICATION FILED NOV. 12, 1910.

1,182,078.

Patented May 9, 1916.

Fig. 1.

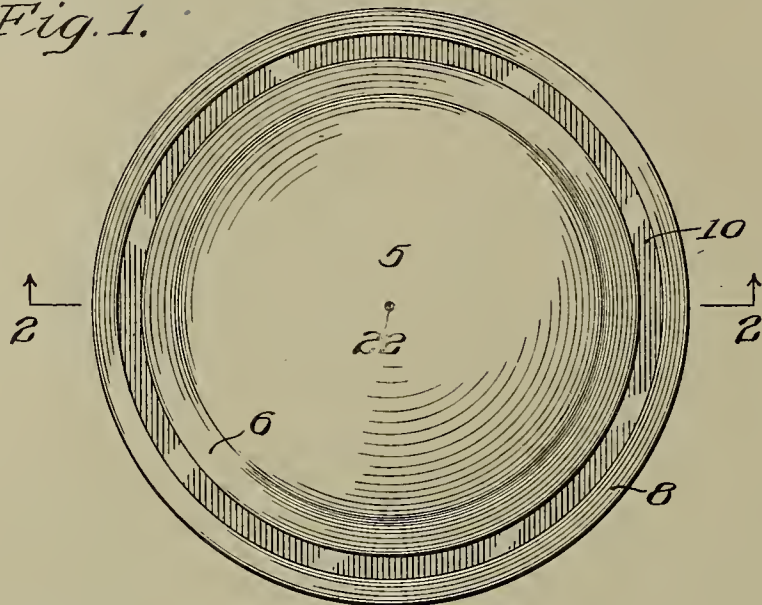


Fig. 2.



Fig. 3.

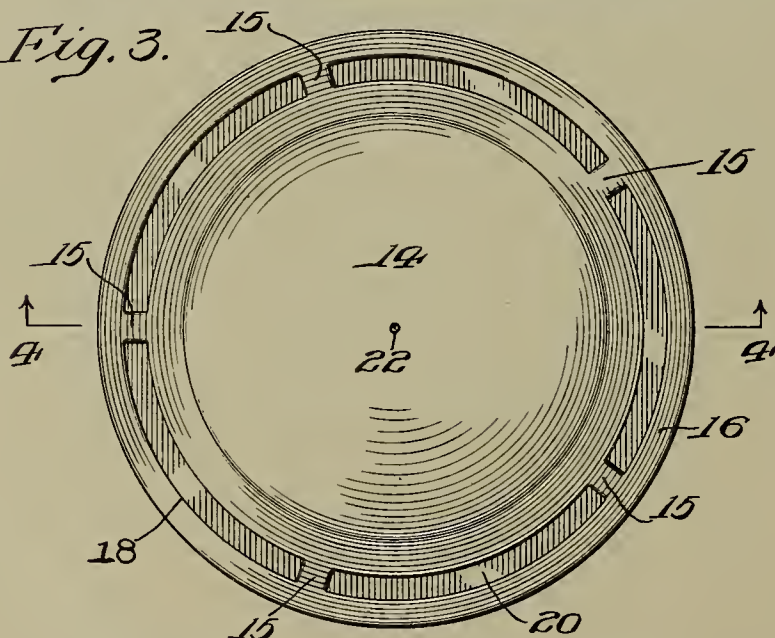


Fig. 4.



WITNESSES
F. J. Hartman.
Clifton C. Halliwell

BY

INVENTOR
John H. Elfering.

1 H. M. V. L. L.

ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN H. ELFERING, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX DIAPHRAGM.

1,182,078.

Specification of Letters Patent.

Patented May 9, 1916.

Application filed November 12, 1910. Serial No. 591,947.

To all whom it may concern:

Be it known that I, JOHN H. ELFERING, a citizen of the United States, and a resident of Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Sound-Box Diaphragms, whereof the following is a specification, reference being had to the accompanying drawing.

This invention particularly relates to diaphragms for sound recording and reproducing devices, such as are preferably adapted to talking machines.

The principal object of this invention is to provide a diaphragm that will readily respond to the most delicate vibrations and accurately record and reproduce all of the high and low tones and the included range with equal clearness.

Further objects of this invention are to provide a diaphragm having its major portion formed substantially inflexible and capable of reciprocation independently of its margin; and to provide means to flexibly connect said inflexible major portion with said margin.

The form of this invention hereinafter described provides a diaphragm comprising a central conically dished inflexible plate, having a peripheral flange extended in a plane in substantially perpendicular relation to the axis of said conical plate, a separate annular margin surrounding said flange in a plane therewith, and a thin flexible imperforable membrane connecting said flange and margin and arranged to support said inflexible plate.

This invention further includes all of the various novel features of construction and arrangement hereinafter more definitely specified.

In the accompanying drawing Figure 1 is a front elevational view of a diaphragm showing the preferred embodiment of this invention; Fig. 2 is a central transverse sectional view taken on the line 2—2 in Fig. 1; Fig. 3 is a front elevational view of a modification of the structure shown in Fig. 1; and Fig. 4 is a transverse sectional view of the diaphragm shown in Fig. 3 and taken on the line 4—4 in said figure.

In the form of this invention shown in Figs. 1 and 2 the central major portion of the diaphragm comprises the conically dished disk or plate 5, which as best shown

in Fig. 2 has the peripheral flange 6 extended in a plane in perpendicular relation to the axis of said diaphragm and surrounded by the annular marginal member 8 in spaced relation to the periphery of said flange 6, and in a plane therewith. Said marginal member 8 is connected with the flange 6 by a thin membrane 10, which may be formed by any suitable imperforable flexible material, preferably gold beater's skin, and which may be conveniently secured to said connected members by any suitable adhesive material. Said membrane 10 is arranged to support the central conical plate 5 in reciprocatory relation to the marginal member 8 which may be suitably secured in a sound box of any convenient construction.

It may be here noted that the diaphragm may be formed of any suitable material preferably paper or other fibrous material which may be treated with a resinous solution or other convenient material to render it impervious to any atmospheric conditions or moisture or may be formed of any stiff sheet material.

The form of this invention shown in Figs. 3 and 4, provides a diaphragm similar to the diaphragm shown in Figs. 1 and 2, and comprises the rigid central portion forming the conically dished plate 14 which is connected by the narrow webs or spokes 15 with a sound box engaging marginal portion 16, forming the arc-shaped apertures 18, which are local to the periphery of said diaphragm, and which permit the free relative vibration of the central portion or plate 14, with respect to the marginal portion 16 to which it is connected by the flexible membrane 20. As best shown in Figs. 1 and 3, the central plates 5 and 14 are respectively provided with apertures 22, for the convenient attachment of a stylus bar (not shown) which may be coöperative therewith to record and reproduce sound.

It is well known that in diaphragms wherein the margin is engaged in a sound box, and the intermediate portion is free to vibrate to reproduce sound, the central portion which is connected with the stylus bar is afforded the maximum vibration, while the surface intermediate of the central portion and the periphery vibrates with varying force diminishing toward the margin of the diaphragm which is engaged. Therefore it will be readily observed that a diaphragm

constructed in accordance with this invention is advantageous in that the major portion is substantially inflexible, and is reciprocated bodily, thus vibrating substantially uniformly throughout its extent, and consequently the compression and rarefaction of the air in the sound conveyer due to the vibration of said diaphragm is uniform throughout its extent.

10 It is not desired to limit this invention to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of the invention as defined in the
15 appended claims.

Having thus described my invention, I claim:

20 1. A diaphragm having a substantially rigid major central portion, a marginal portion connected thereto by relatively narrow

flexible radial sections, and a flexible concentric membrane intermediate of said central and said marginal portions.

2. A diaphragm having a rigid major central portion connected with a marginal portion by integral relatively narrow flexible radial sections and a flexible web connecting said central portion and marginal portion together.

3. A diaphragm comprising a central comparatively rigid conical dished major portion, a surrounding portion and a plurality of radial webs and an annular web connecting said portions.

In witness whereof I have hereunto set my hand and seal this 9th day of November A. D. 1910.

JOHN H. ELFERING. [L. S.]

Witnesses:

EDWARD K. MACEWAN,
FRANK B. MIDDLETON, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH PATENT.

1,182,233

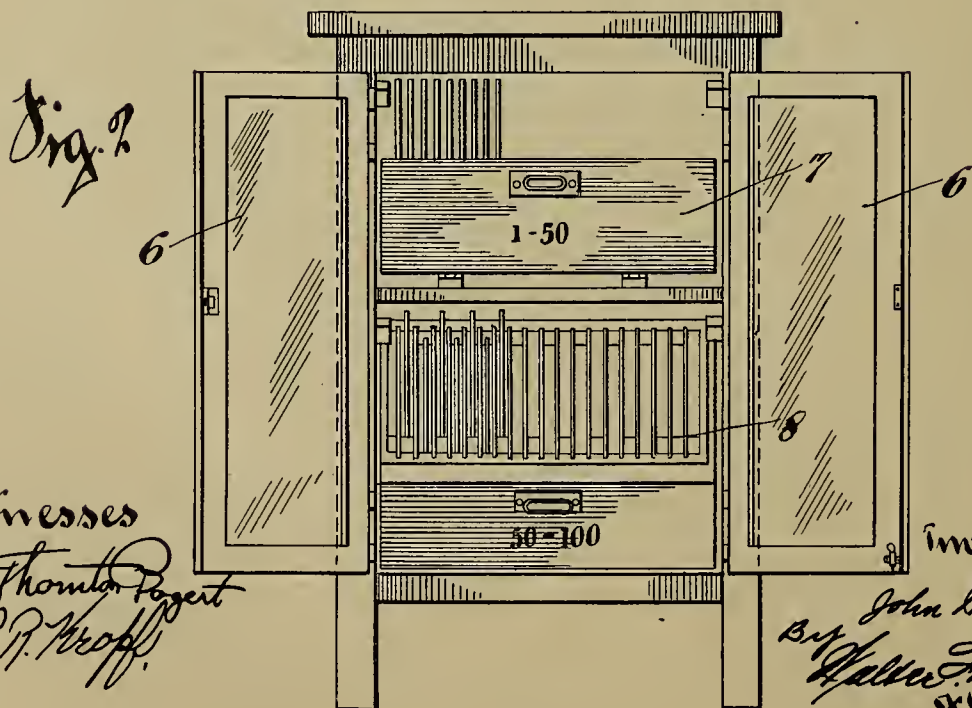
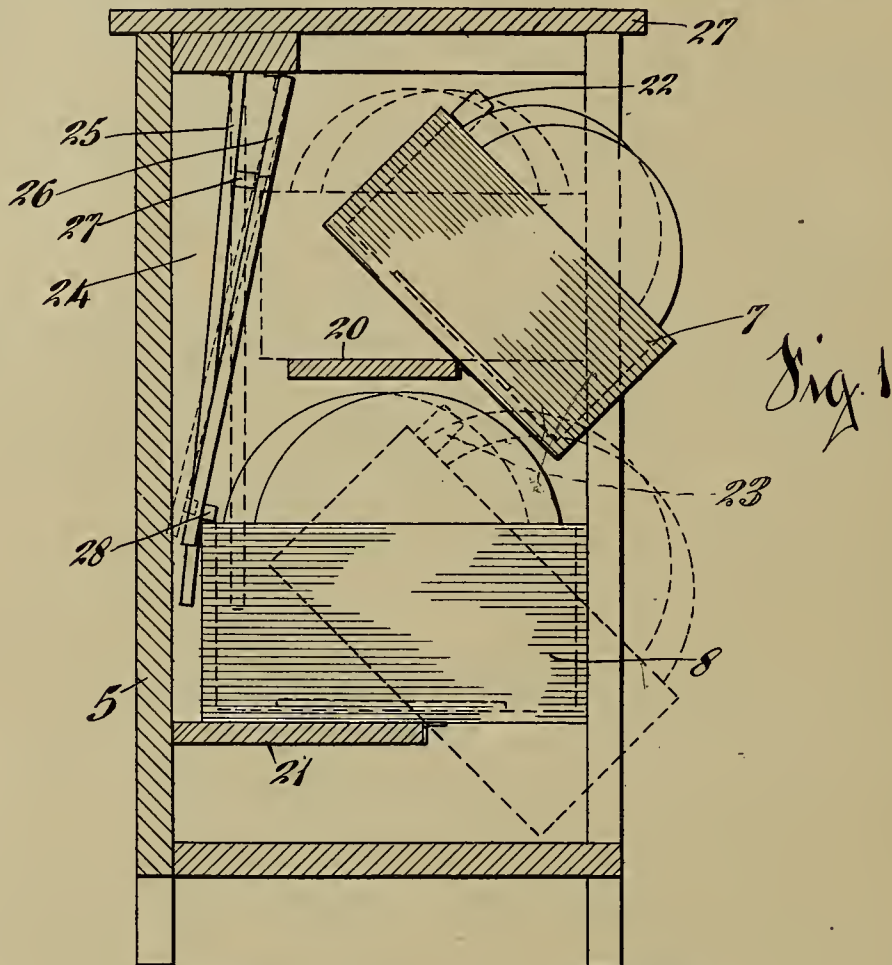
FILING CABINET FOR DISK SOUND RECORDS,
1,182,233-----J. M. Waddell,
Patented-May 9th, 1916.
Filed-Feb. 16th, 1914.

J. M. WADDELL.
 FILING CABINET FOR DISK SOUND RECORDS.
 APPLICATION FILED FEB. 16, 1914.

1,182,233.

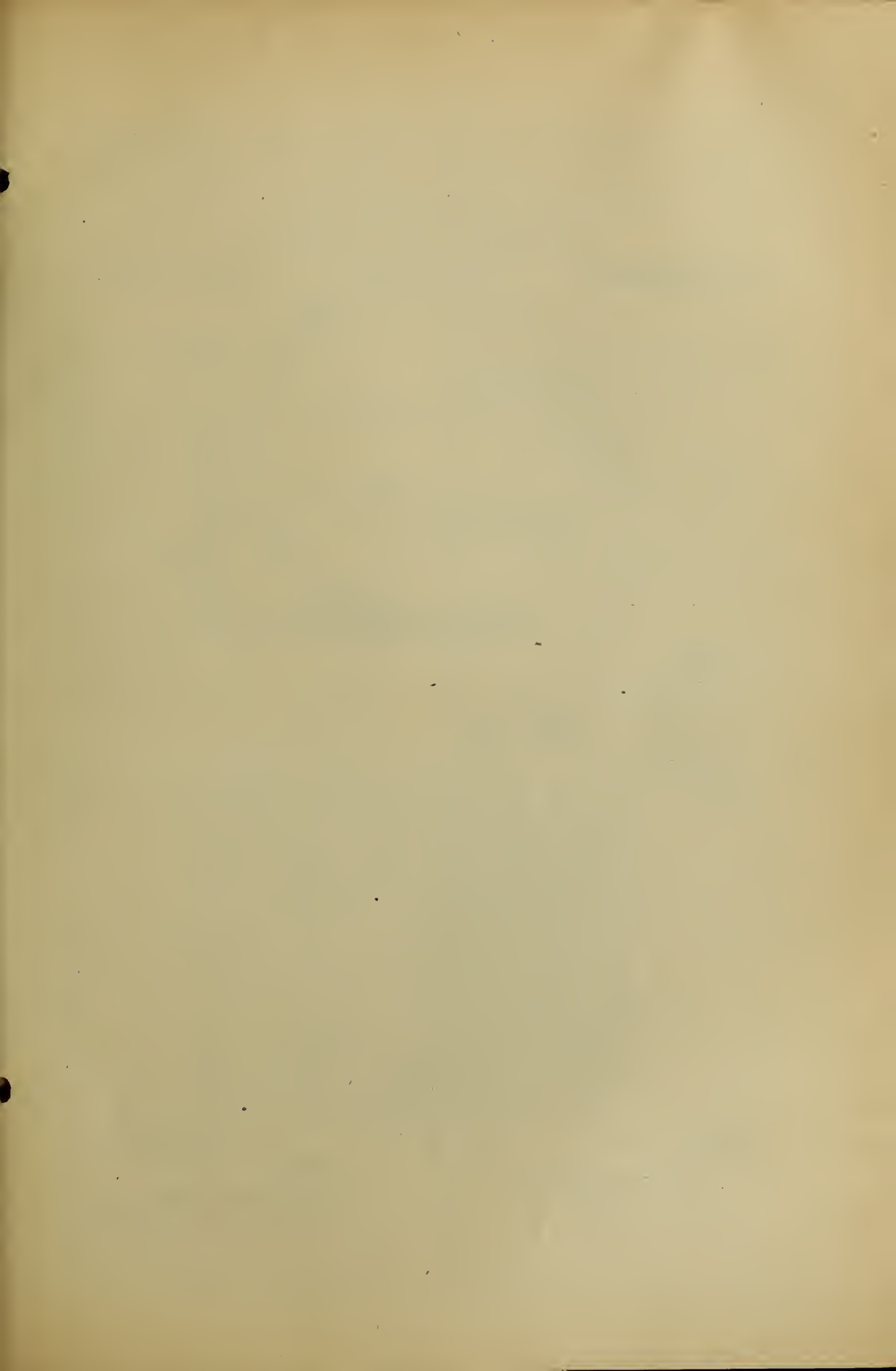
Patented May 9, 1916.

2 SHEETS—SHEET 1.



Witnesses
 W. Thomas Page
 B. P. Kroff

Inventor
 John M. Waddell
 By Walter H. Murray
 Attorney



UNITED STATES PATENT OFFICE.

JOHN M. WADDELL, OF GREENFIELD, OHIO.

FILING-CABINET FOR DISK SOUND-RECORDS.

1,182,233.

Specification of Letters Patent.

Patented May 9, 1916.

Application filed February 16, 1914. Serial No. 818,829.

To all whom it may concern:

Be it known that I, JOHN M. WADDELL, a citizen of the United States of America, and resident of Greenfield, county of Highland, and State of Ohio, have invented certain new and useful Improvements in Filing-Cabinets for Disk Sound-Records, of which the following is a specification.

This invention relates to filing cabinets for disk sound records, and has for an object to produce a cabinet in which disks may be filed compactly and so that any disk may be readily removed by hand.

A further object is to produce a filing cabinet, in which any desired record may be readily removed or replaced by one's fingers.

A further object is to produce a filing cabinet, in which no mechanism is used to effect removal and replacing of the records.

These and other objects are attained in the filing cabinet described in the following specification, and illustrated in the accompanying drawings, in which,

Figure 1 is a side elevation taken partially in section, of a cabinet embodying my invention, and showing the upper record filing case in the record-accessible position. Fig. 2 is a front elevation of the cabinet illustrated in Fig. 1, showing the interior of the cabinet with the lower record filing case in the record-accessible position. Fig. 3 is a transverse sectional view taken on line 3—3 of Fig. 4. Fig. 4 is a plan view of a record filing case used in the cabinet embodying my invention.

The cabinet illustrated consists of a frame 5, having doors 6, and record filing cases 7 and 8, movably mounted in the frame. These filing cases consist of boxes 9, in which a series of transverse partitions 10 are secured. The space or compartment between adjacent partitions is of sufficient width to permit a disk record to pass freely between them. Blocks 11 are placed in the ends 12 of alternate spaces or compartments 13 on one side 14 of each case, while in the opposite ends 15 of the alternate spaces 16, blocks 17 are placed. This arrangement of blocks creates in effect a series of record receiving spaces, which have their ends staggered with relation to one another, as shown in Fig. 4. When records are placed in these spaces, the edges of the records of one alternate series 18 are staggered with relation to the edges of the records of the other alter-

nate series, as shown in Figs. 3 and 4. This arrangement permits each of the records to be easily grasped by one's fingers, as shown in Fig. 4, and thus greatly facilitates the removal of records from the case.

In order to afford access to any desired record, I have provided that each record be given a number, and that it be filed in the space having a number corresponding to that of the record. The subject matter of the record is then written in an alphabetically indexed book, together with the number of the space in the filing case to which it belongs. Thus the desired record may be obtained at any time. The system of numbering the record spaces is shown at 19^a in Fig. 4.

The mounting of the above described filing cases in the body or frame 5 of the cabinet is accomplished in the following manner: Shelves 20 and 21 are located in the cabinet, to receive the filing cases which are hinged thereto, as shown in Fig. 1. The hinges are secured to the edges of the shelves and to the bottom of each case, in a position such that when the case is resting upon the shelf, its center of gravity will lie back of the hinge, in which position the case will remain upon the shelf. When, however, the case is tipped forward, to occupy the position of the top case shown in Fig. 1, the center of gravity will shift to cause the case to occupy the tilted position, without any tendency to return to the normal position, until manually placed in that position. Stops 22 and 23 are secured to the side walls of the cabinet, to retain the cases in the tilted positions shown.

It will be seen by referring to Fig. 1, that only one case at a time may occupy the tilted position, for the reason that the lower front edge of the upper filing case would collide with the tops of the records in the lower filing case, were the lower case also occupying the tilted positions at the same time, as shown in dotted lines, Fig. 1. If, however, the upper case was first caused to occupy the tilted position, the lower case would be prevented from also occupying this position for the same reason. In order to prevent more than one case from being placed in the tilted position at any one time, to prevent injury to the records in the lower case, I have provided locking means 24, which are adapted to automatically lock either one of the cases

in its normal position on the shelf, when the other case is brought to occupy the tilted position. This locking means consists of two bars 25 and 26, which are hinged at 5 their upper ends to the under side of the top of the cabinet, as shown in Fig. 1, and are provided with stop blocks 27 and 28. In the normal position of the filing cases, the rear top edges thereof contact the bars 10 25 and 26 and hold the stop blocks 27 and 28 out of contact with these edges. When, however, one of the filing cases, as for example, the top case, is tilted, as shown in Fig. 1, bar 26 swings inwardly until block 28 has 15 been swung over the top of the rear board of the lower filing case, thus preventing this case from being tilted.

In order to move the lower case to the tilted or record-accessible position, the top 20 case must be moved to its normal position, shown in dotted lines in Fig. 1. This causes the bar 26 to be pushed back, withdrawing block 28, and permitting the lower filing case to be moved to the tilted position, shown 25 in dotted lines. In moving to this position, bar 25 drops to the position shown, thus bringing stop 27 to engage the top rear edge of the upper filing case and to thereby lock it in the normal position, shown in dotted 30 lines.

In the cabinet above described, the sound records are so compactly filed, that the spaces between the records are reduced to a minimum, and yet each record is as readily 35 accessible for removal by one's fingers, as

though a much greater amount of space had been allowed between them.

Having thus described my invention, what I claim is:

1. A filing case for flat record disks having a series of transversely extending partitions located therein to form a series of transverse record receiving spaces, and blocks located in alternate opposite ends of consecutive spaces to cause the ends of adjacent spaces to be staggered with relation to one another. 40 45

2. In a filing cabinet for sound records the combination of a frame, a series of superimposed filing cases mounted in the 50 frame and adapted to be moved to record-accessible positions, and a series of depending lock bars pivotally attached at their upper ends to the frame, each bar being adapted to be engaged by one of the cases 55 when the case is in its normal position, to hold the bar out of locking engagement with the remaining cases, and to swing into engagement with the remaining cases to lock the cases against movement when the case 60 controlling its operation is moved to its record-accessible position.

In testimony whereof, I have hereunto subscribed my name this 12th day of February, 1914.

JOHN M. WADDELL.

Witnesses:

C. W. CROSS,
T. L. STRATTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPEOPHONE PATENT.

AUTOMATIC TALKING MACHINE,
1,182,551-----J. Gabel,
Patented-May 9th, 1916.
Filed-Aug. 18th, 1909;

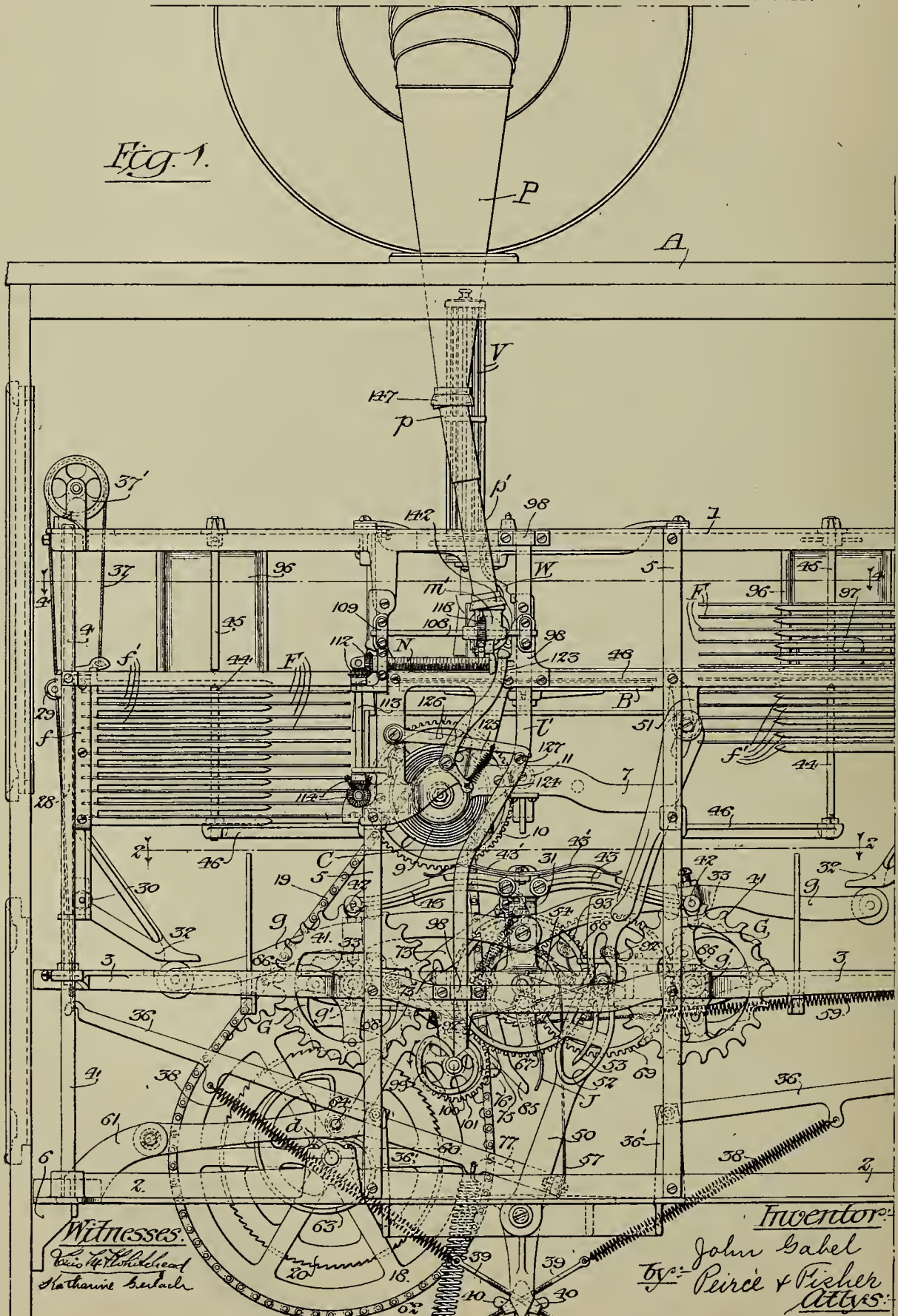
J. GABEL.
 AUTOMATIC TALKING MACHINE.
 APPLICATION FILED AUG. 18, 1909.

1,182,551.

Patented May 9, 1916.

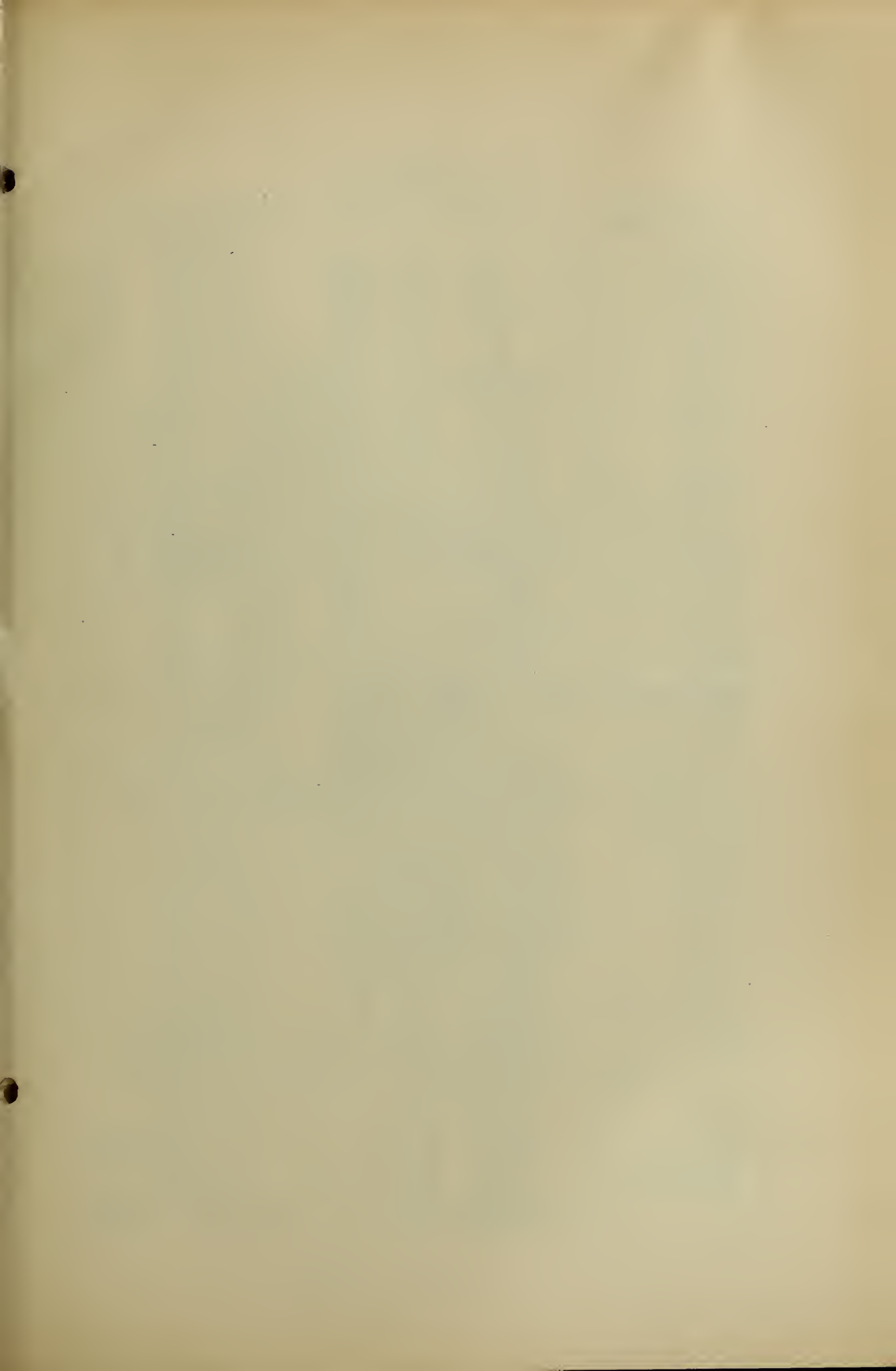
7 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
 Louis H. Whitehead
 Nathaniel Beckwith

Inventor:
 John Gabel
 by: Pierce & Fisher
 Attys.

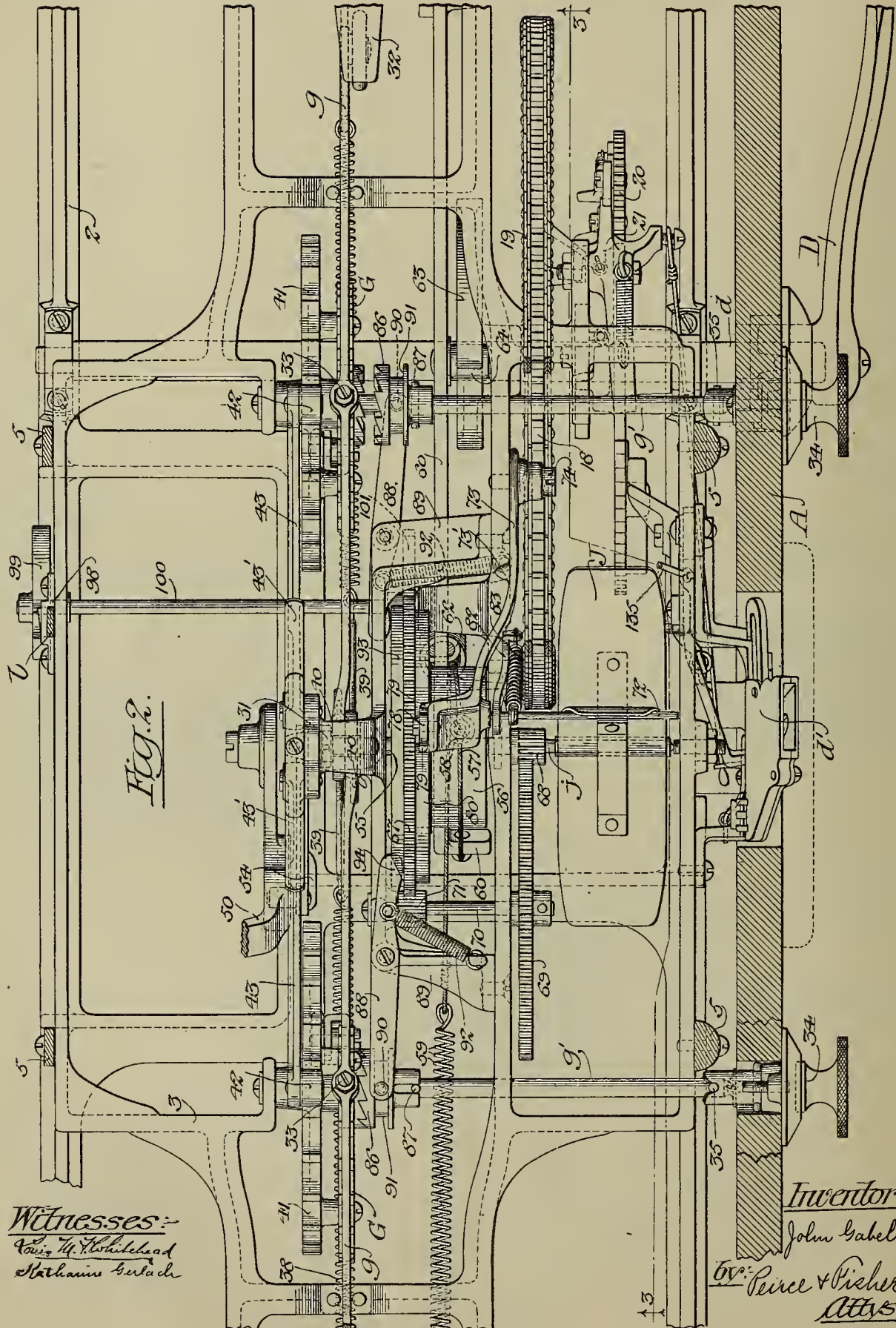


J. GABEL.
 AUTOMATIC TALKING MACHINE.
 APPLICATION FILED AUG. 18, 1909.

1,182,551.

Patented May 9, 1916.

7 SHEETS—SHEET 2.



Witnesses:
 Louis H. Whitehead
 Nathaniel Gutach

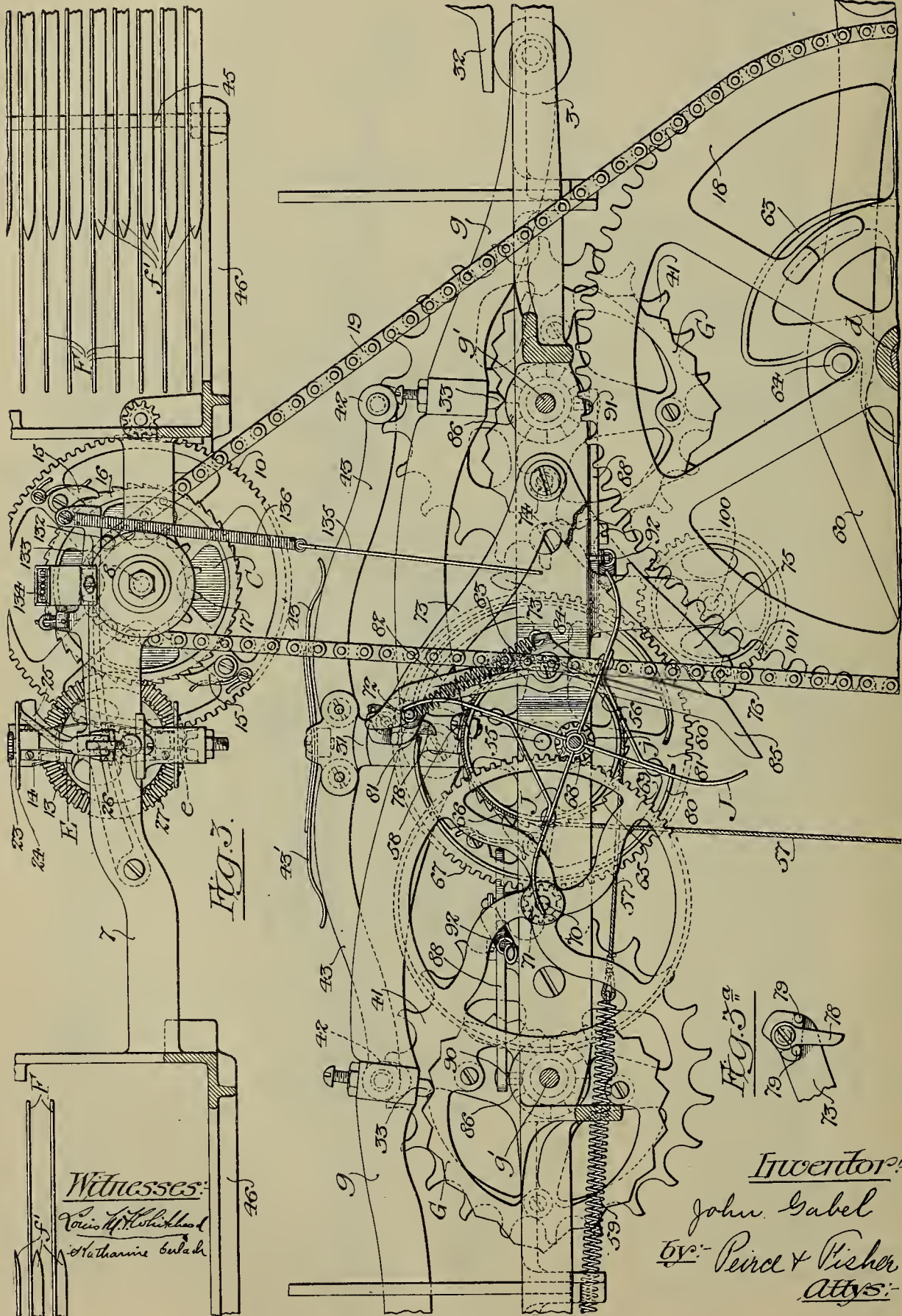
Inventor:
 John Gabel
 by: Peirce & Fisher
 Attys.

1,182,551.

J. GABEL.
AUTOMATIC TALKING MACHINE.
APPLICATION FILED AUG. 18, 1909.

Patented May 9, 1916.

7 SHEETS—SHEET 3.



Witnesses:

Charles H. H. H. H. H.
Nathanine G. G. G.

Fig. 3



Inventor:

John Gabel

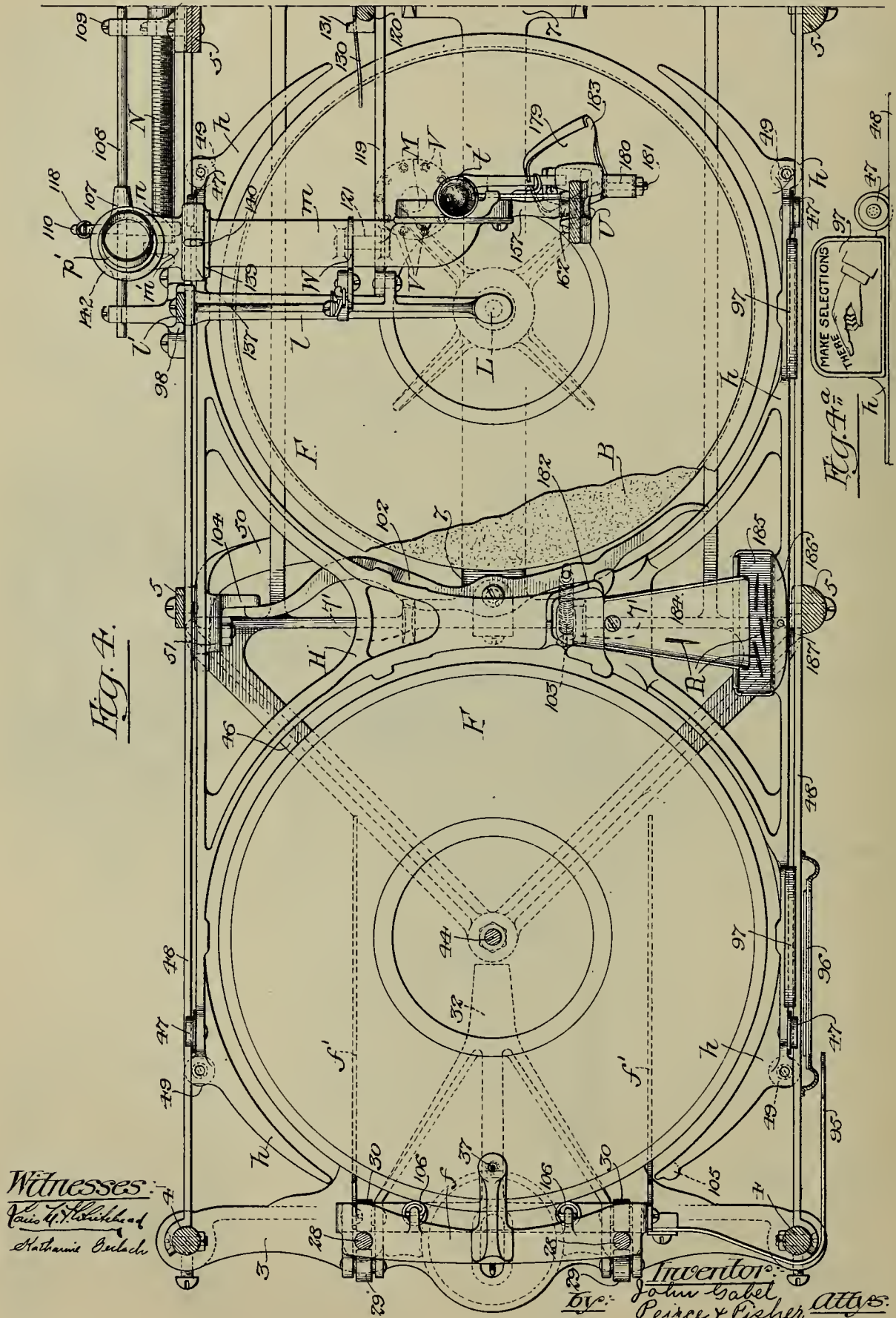
By: Peirce & Fisher
Attys:

J. GABEL.
 AUTOMATIC TALKING MACHINE.
 APPLICATION FILED AUG. 18, 1909.

1,182,551.

Patented May 9, 1916.

7 SHEETS—SHEET 4.

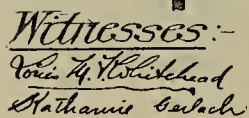


Witnesses:
 Louis L. Whithead
 Nathaniel C. C. C.

Inventor:
 John Gabel
 By: Peck & Fisher, Attys.

1,182,551.

7 SHEETS—SHEET 5.



 *Inventor:-*

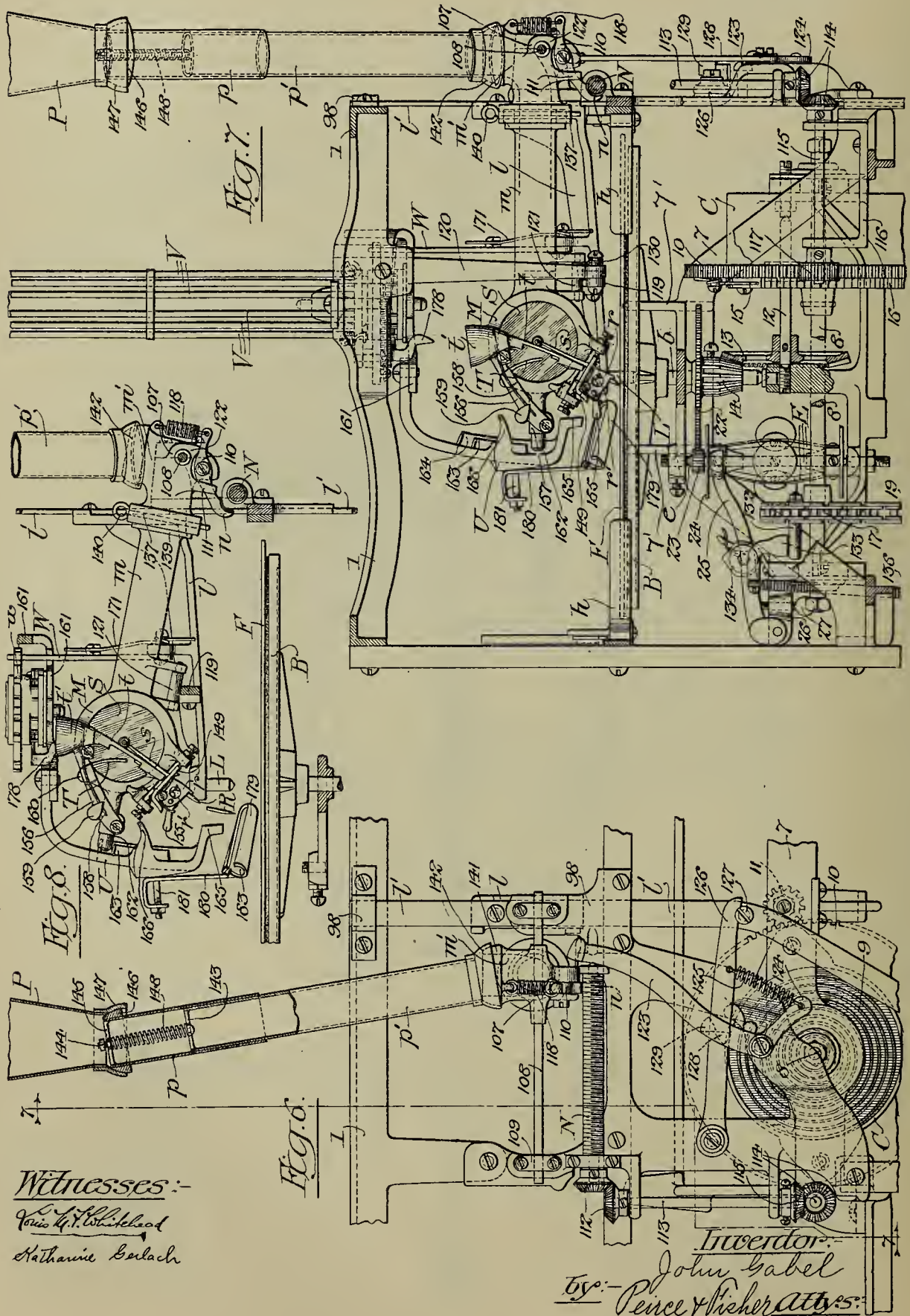
By:- John Gabel
Pierce & Fisher Attys.

J. GABEL.
AUTOMATIC TALKING MACHINE.
APPLICATION FILED AUG. 18, 1909.

Patented May 9, 1916.

7 SHEETS—SHEET 6.

1,182,551.



1,182,551.

Patented May 9, 1916.

7 SHEETS—SHEET 7.

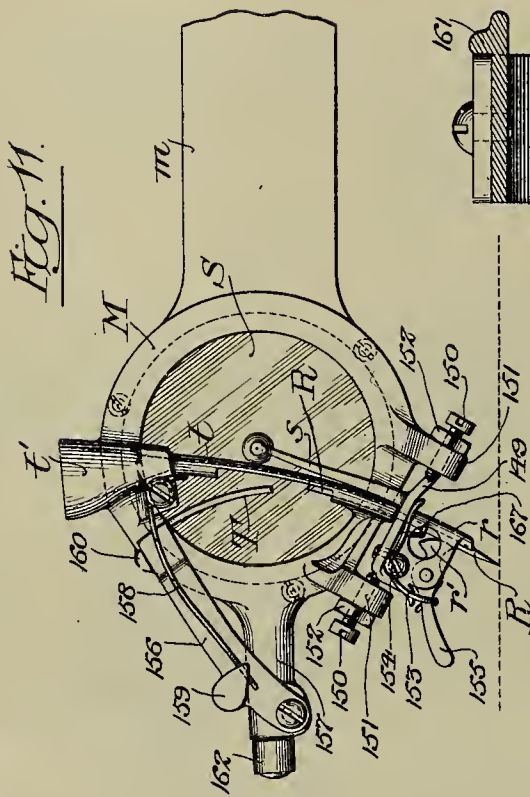


Fig. 11.

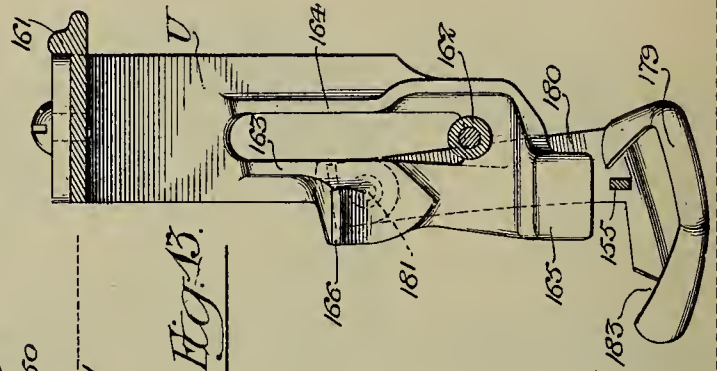
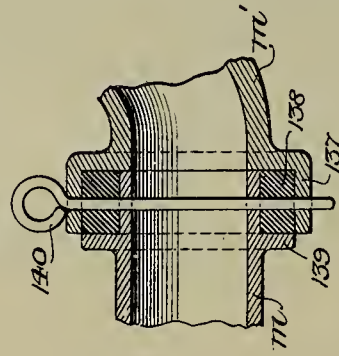


Fig. 13.



UNITED STATES PATENT OFFICE.

JOHN GABEL, OF CHICAGO, ILLINOIS.

AUTOMATIC TALKING-MACHINE.

1,182,551.

Specification of Letters Patent.

Patented May 9, 1916.

Application filed August 18, 1909. Serial No. 513,428.

To all whom it may concern:

Be it known that I, JOHN GABEL, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Automatic Talking-Machines, of which the following is a specification.

The invention relates to talking or sound-reproducing machines of the type set forth in an application filed by me February 26, 1906, Serial Number 302,878, in which mechanism is provided for automatically engaging the disks or records and the sound-box needle or stylus and for automatically shifting the sound-box or reproducer and starting and stopping the machine.

The object of the present invention, is to improve and simplify the construction and provide means whereby its operation is rendered more positive and certain.

A further object of the invention is to provide means which will prevent the machine from getting out of order even under the careless handling to which it is sometimes subjected.

With these and other objects in view, as will presently appear, the invention consists in the features of improvement hereinafter set forth, illustrated in preferred form in the accompanying drawings and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a rear view of the machine with the back door of the casing removed to expose the operating mechanism, Fig. 2 is a plan view of part of the operating mechanism with parts shown in section on the line 2—2 of Fig. 1. Fig. 3 is an enlarged detail view with parts shown in vertical section on the line 3—3 of Fig. 2 and viewing the mechanism from the front of the machine. Fig. 3^a is a detail view in rear elevation of parts shown in Fig. 3. Fig. 4 is a plan view of the upper portion of the mechanism with parts shown in section on the line 4—4 of Fig. 1. Fig. 4^a is a view in front elevation of parts shown in Fig. 4. Fig. 5 is an end view of the upper portion of the machine. Fig. 6 is an enlarged detail view of parts shown in Fig. 1. Fig. 7 is a view of the mechanism shown in Fig. 6 with parts in section on the line 7—7 of Fig. 6. Fig. 8 is a view of parts shown in Fig. 7 in shifted position. Fig. 9 is an enlarged detail view in horizontal section of the needle-holder or magazine. Fig. 10 is a

view in elevation thereof. Fig. 11 is an enlarged view in elevation of the sound-box illustrating the needle-changing mechanism. Fig. 12 is a sectional view of a joint of the sound box arm. Fig. 13 is an enlarged detail view of the needle changing mechanism with parts shown in section.

As in the construction set forth in the prior application referred to, the machine is inclosed within a suitable casing A (shown only in Fig. 1) upon a suitable framework. This framework comprises upper, lower and intermediate horizontal frames 1, 2 and 3 that are preferably formed of cast metal and connected by corner uprights 4 and intermediate uprights 5. The framework is removably mounted in the casing, preferably upon lugs 6 secured to the side walls thereof.

The turn-table B is arranged in the upper, central portion of the framework upon the upper end of a short, vertical shaft *b* that is journaled in a supplemental frame 7 secured to the uprights 5 (see Figs. 1 and 7). The turn-table is driven by a spring motor comprising a fixed drum C, a short, horizontal shaft 8 extending through the drum and a coiled spring 9 arranged within the drum, with one end connected thereto and the other end connected to the shaft 8. A gear 10 on the shaft 8, meshes with a pinion 11 upon a short, horizontal shaft 12 and this shaft carries a beveled gear 13 at its inner end (see Fig. 7) which meshes with a beveled pinion 14 upon the turn-table shaft 6. The gear 10 is loose on the shaft 8 and is provided with a pair of spring-held pawls 15 (see Fig. 3) which engage the teeth of a ratchet 16 that is fixed to the shaft, so that the gear is driven when the spring 9 rotates the shaft in one direction and thereby rotates the turn-table through the medium of the train of gearing described. The one-way connection formed by the pawls 15 and ratchet 16 between the gear and the shaft 12, permits the rotation of the shaft in opposite direction to wind up the spring 9 without moving the gear 12 or the turn-table B.

The motor spring 9 is wound up in the same manner as set forth in the prior application referred to. A small sprocket wheel 17 on the motor shaft 8, is connected to a large sprocket wheel 18 by a chain 19 (see Figs. 1, 2, 3, and 7). The wheel 18 is mounted upon a shaft *d* that is journaled in suitable bearings in the lower horizontal frame 2, projects through the front wall of

the inclosing casing A, and is provided on its forward end with a crank-arm D (see Fig. 2). The sprocket wheel 18 is loose on the shaft *d* and has a one-way connection with a ratchet wheel 20 that is fixed to the shaft. A pawl 21 normally locks the ratchet wheel, shaft and crank-arm and is arranged to be unlocked by suitable coin-operating mechanism *d'*. This coin-controlling mechanism is similar to that set forth in the prior application referred to and need not be more fully set forth here. As in the prior construction, the insertion of a suitable coin unlocks the shaft *d*, so that the latter can be turned through one revolution by the user of the machine to thereby rotate the sprocket wheel 18 and wind up the turn-table motor. At the end of the winding movement, the sprocket wheel 18 is freed from the ratchet wheel 20 and it, together with the other parts connected to the spring motor, are driven in the opposite direction and the turn-table is rotated to effect the reproduction of the record mounted thereon.

The vertical shaft *b*, on which the turn-table is mounted, is provided with a gear 22 (see Fig. 7) that meshes with the teeth of a pinion 23 mounted on the upper end of a short, vertical shaft *e*. This shaft carries a series of weighted, spring governor arms E that are connected at their lower ends to a collar fixed on the shaft and at their upper ends to a disk 24 arranged to slide on the shaft. This disk is arranged to engage a friction button of leather or the like on the end of an arm 25 that is pivoted at its outer end to a bracket 26 on the supplemental motor frame 7. An adjusting screw 27 threaded through the bracket 26, engages the pivoted end of the arm 25 and serves to regulate the pressure of the inner end of the arm upon the disk 24 to thereby vary the speed of the turn-table. The governor operates to maintain the speed of the turn-table uniform in accordance with the setting of the screw 27 and pressure arm 25.

The disk records F are shifted onto the turn-table B from a pair of magazines or record-holders *f* arranged on opposite sides thereof. Each record-holder or magazine comprises a rectangular framework (see Figs. 1, 4 and 5) having a series of inwardly-projecting arms *f'* upon which the records F are supported and the frame portion of each magazine is mounted to slide vertically on a pair of guide-rods 28 that are fixed at their ends to the upper and lower horizontal frames 1 and 2. At its upper portion, the frame of the magazine is provided with anti-friction rolls 29 which engage the outer sides of the rods 28, and at its lower end with anti-friction rolls 30 which engage the inner sides of the rods.

The magazines are vertically shifted to

bring any one of the records thereon in line with the turn-table B by a pair of horizontally-disposed arms *g* (see Figs. 1, 2 and 3). These arms are pivoted at their inner ends to an upright 31 on the intermediate, horizontal frame 3 and their outer ends are provided with anti-friction rollers that engage a pair of arms 32 that project inwardly from the lower end of the magazine frame. The arms *g* and the record magazines or holders are shifted by a pair of heart-shaped cams G that are mounted upon the rear ends of a pair of horizontal shafts *g'* journaled in suitable bearings in the intermediate, horizontal frame 3 (see Figs. 2 and 3). These heart-shaped cams are provided with beveled recesses that are engaged by beveled abutments 33 adjustably mounted upon the arms *g* and these abutments center themselves in any one of the recesses of the cams and thereby accurately position the record magazines with one of the records thereon in line with the turn-table. The shafts *g'* and cams G are turned by the user of the machine to bring the desired record opposite the turn-table through the medium of a pair of knobs 34 that are mounted upon the front wall of the casing A. The forward ends of the shafts are provided with pins 35 that detachably engage notches in the hubs of these knobs.

To enable the user of the machine to easily shift the record-holders or magazines, the latter are connected to a pair of counterbalancing arms 36 by cords 37 that extend upwardly over guide rollers 37' on the upper portion of the frame and are connected to the outer ends of the arms 36 (see Fig. 1). The inner ends of these arms are pivoted on uprights 36' on the lower horizontal frame 2, and springs 38 are connected to these arms adjacent their outer ends. The inner ends of these springs are connected to a pair of adjusting screws 39 that extend through a depending lug on the lower horizontal frame 2 and are provided with adjusting wing-nuts 40. The records frequently vary in weight, but by adjusting the nut 40, the proper tension can be placed on the spring 38 to nearly counterbalance the record-holders when filled with records, so that the user of the machine can readily shift the same by turning the knobs 34 to bring the record which he desires played in line with the turn-table B. A pair of ratchet wheels 41 are fixed to the cams G and these wheels are arranged to be engaged by rollers 42 upon the outer ends of a pair of arms 43. These arms are pivoted on the upright 31 and are engaged by leaf-springs 44 to hold the rollers in engagement with the ratchet wheels 41 and thereby accurately position the heart-shaped cams to hold the magazine with one of the records thereon in line with the turn-table.

The records F on each record-holder or magazine are held against displacement therefrom by a pair of stationary pins 44 and 45. The lower pins 44 are fixed at their lower ends to a pair of brackets 46 while the upper pins 45 are detachably connected at their upper ends to cross-arms on the upper horizontal frame 1. These pins extend through the usual central openings of the disk records and hold all of the records against displacement from the magazines, except the records that are in line with the turn-table. The ends of the pins are spaced apart, as shown, so that the records on the magazines in line with the turn-table are not held in place by the pins and can be shifted in horizontal direction onto the turn-table and back to position in the magazine-holders. By removing the upper pins 45, the records in the holders or magazines can be readily changed.

The records are shifted from the magazines onto the turn-table and back again to position in the magazines by a horizontally shifting carriage H which comprises two sets of curved arms h that are connected together at the center of the carriage and are arranged to engage a record on the turn-table and a record in one of the magazines that is in line with the turn-table (see Fig. 4). Rollers 47 on the carriage, engage the upper edges of a pair of horizontal guide-rails 48 that are fixed to the uprights 4 and 5 of the frame. Washers 49 fixed to the carriage, extend beneath the guide-rails 48 and hold the carriage against vertical displacement (see Fig. 5).

The carriage alternately shifts in opposite directions from one side of the machine to the other at the different operations of the machine, that is to say, at one operation it shifts in one direction and at the next operation in the opposite direction. At each operation it moves the record on the turn-table into one of the holders or magazines and moves a record from the other or opposite holder or magazine onto the turn-table. The carriage is shifted by a lever 50 (see Fig. 1) that is pivoted at its lower end to the lower horizontal frame 2 and is provided with a slotted upper end that engages a pin on a bracket 51 that depends from the rear portion of the carriage H. This lever is provided with a cam slot 52 having a curved, intermediate rib 53, and the slot is engaged by a roller on the end of a crank-arm 54. This crank-arm is mounted upon the rear end of a shaft 55 that is journaled in suitable bearings on the intermediate horizontal frame 3. At its forward end (see Fig. 2), the shaft is provided with a drum 56 about which is wound a cord 57. This cord is secured to the drum by a screw 58 and one end is connected to a horizontal spring 59, the opposite end of which is fixed

to the machine frame. The other end of the cord is connected to the inner end of an arm 60 (see Figs. 1 and 2) which is pivoted at its outer end to a lug 61 on the lower horizontal frame 2. A heavy motor spring 62 is connected to the arm 60 and to the bottom of the machine casing and this spring serves, through the medium of the arm 60 and cord 57, to rotate the drum 56 and shaft 55. This spring is placed under tension by a cam 63 that is fixed to the winding shaft d, the cam being arranged to engage a pin 64 on the arm 60. When the operator releases the winding shaft by inserting a suitable coin and rotates it through one revolution, the cam 63 elevates the arm 60 and places the motor spring 62 under tension. The spring 59 then takes up the slack in the cord 57 and rotates the drum 56. This drum is loose on the shaft but is provided with a series of ratchet teeth 65 (see Fig. 3) which are arranged to engage a spring-held pawl 66 pivoted upon a gear 67 that is fixed to the shaft 55. When the motor-spring 62 is placed under tension, the ratchet teeth 65 pass idly beneath the pawl 66 but, when the pin 64 on the lever 60 passes over the high point of the cam 63, the spring 62 draws the arm downwardly and the ratchet teeth 65 upon the drum 56 act, through the medium of the pawl 66 to drive the gear 67 and shaft 55 and thereby operate the crank-arm 54 and the carriage shift-lever 50. A fan governor J controls the operation of this spring-motor mechanism. This fan governor is mounted upon a short, horizontal shaft j that is journaled in suitable bearings on the intermediate horizontal frame 3. The shaft j is provided with a pinion 68 that meshes with the teeth of a gear 69 on a short, horizontal shaft 70 (see Fig. 2). The rear end of the shaft 70 is provided with a pinion 71 that meshes with the teeth of the gear 67, so that the fan governor is driven with the gear and shaft to control its speed. The movement of the shaft 55 and crank-arm 54 thereon, is limited to a half revolution at each operation of the machine, so as to move the lever 50 and carriage H alternately in opposite directions at the successive operations of the machine. The shaft 55 and its operating spring-motor are normally held against movement by a pin 72 (see Figs. 2 and 3) that is arranged to engage the fan governor J. This pin is fixed to the end of the upper arm 73 of a bell-crank that is connected by a pivot pin 74 to the mid-portion of the intermediate horizontal frame 3. The lower arm 75 of the bell-crank is provided with a rearwardly projecting lug 76 (see Figs. 1 and 3) that is arranged to be engaged by a forwardly projecting lug 77 on the end of the arm 60, when the latter is lifted by the cam 63 to place the motor-spring 62 under tension. The pin 72 is

thereby disengaged from the fan governor J to permit the operation of the shifting motor. A dog or pawl 78 is pivoted upon the end of the upper arm 73 of the bell-crank and has a limited play between a pair of lugs 79 thereon (see Fig. 3^a). This dog coöperates with a cam mounted on the gear 67 and which comprises a pair of semi-circular flanges 80 having openings 81 between their ends at diametrically opposite points. Normally, the dog or pawl 78 is located in one of the openings 81, as shown in Fig. 3, and the pin 72 then engages one of the wings of the governor fan J. On the upward swing of the arm 60, the lug 77 thereon strikes the lug 76 on the lower arm 75 of the bell-crank and lifts the pin 72 out of engagement with the governor fan and lifts the dog 78 out of the opening 81.

On the downward movement of the arm 60 under the influence of the motor-spring 62, the gear 67 and shaft 55 are advanced as described, and when the arm 60 releases the bell-crank, the dog 78 thereon rests upon one of the cam flanges 80, so that the pin 72 is held out of the path of movement of the governor fan J until the gear 67 and shaft 55 have made a half revolution. The dog 78 then drops into the opposite recess 81 and the pin 72 engages the fan governor and arrests the operation of the shifter motor. The ends of the semi-circular cam flanges 80 are so inclined that the dog 78 will enter with certainty into the spaces 81. To prevent any accidental disengagement of the pin 72 with the governor fan, a catch 82 is pivotally mounted upon the horizontal frame 3 and is provided with a hooked upper end that is normally held in engagement with the pin 72. A spring 83 extends between the pin 72 and a lug 84 on the catch-arm 82 adjacent its pivot point. This spring serves the double purpose of shifting the bell-crank to move the pin 72 into the path of the fan governor J when the dog 78 is opposite one of the openings 81, and also serves to shift the catch-arm 82 into position to prevent any rebound or accidental disengagement of the pin from the fan governor. The catch-arm 82 is provided with a depending extension or tail-piece 85 which is engaged by the arm 60 as it is raised to disengage the upper hooked end of the catch-arm from the pin 72 just before the lug 77 on the arm 60 engages the bell-crank to shift the pin out of engagement with the fan governor. By this means, the crank-arm 54 on the shaft 55 is operated with certainty for a half revolution at each operation of the machine to alternately shift the arm 50 and carriage H in opposite directions from one side to the other at the successive operations of the machine.

As stated, some one of the records which has been withdrawn from one or the other

of the record-holders or magazines, is in position on the turn-table and this record must be returned to the magazine from which it has been removed at the next operation of the machine at the same time that the record from the full magazine within the arms *h* of the carriage H is shifted thereon to the turn-table. It is necessary, therefore, that the user of the machine shall make his selection from the full magazine and bring the desired record thereon into position between the stationary retaining pins 44 and 45. This record is then free of the pins but is held against displacement because it is then within the arms *h* of the carriage H. The other or opposite magazine from which one of the records has been removed, must remain stationary, so that the record can be returned to proper position thereon at the next operation of the machine. For this reason, means are provided whereby the magazine from which a record has been removed is disconnected from the corresponding knob 34 and for connecting the full magazine to its operating knob so that the user can make his selection therefrom. This mechanism comprises a pair of clutch sleeves 86 (see Fig. 2) which are slidably mounted upon the shafts *g'* but connected to rotate therewith by pins 87 that engage longitudinal slots in the hubs of the clutches. These clutches are provided with ratchet teeth which coöperate with similar clutch teeth formed upon the hubs of the shifter cams G that are loosely mounted upon the shafts *g'*. The clutches are moved into and out of engagement with the shifter cams G by means of a pair of shifter-arms 88 that are pivotally mounted upon a pair of lugs 89 on the intermediate, horizontal frame 3, and are provided with pins 90 on their ends engaging annular grooves 91 formed in the clutch sleeves. Springs 92 are connected to these arms and these springs tend to shift the clutches into engagement with the shifter cams to thereby lock the latter to the shafts *g'*. The ends of the shifter-arms engage a cam-flange 93 upon the rear face of the gear 67. This flange is provided with a notch 94 at one point and the parts are so arranged that the clutch shifter corresponding to the full magazine engages the notch 94 and the corresponding cam G is connected to its shaft *g'* and to the operating knob 34 therefor. The user of the machine can manipulate the full magazine to bring any desired record thereon opposite the turn-table and within the grasp of the arms *h* of the carriage H, so that the record thus selected will be shifted onto the turn-table at the next operation. The clutch corresponding to the magazine from which a record has been removed will, however, be held out of engagement by the flange 93, as shown in Fig. 2, so that this

magazine cannot be shifted and will remain stationary to receive the record on the turn-table at the next operation of the machine.

The ends of the shifter-arms 88 which engage the flange 93, are diametrically opposite so that, at the next operation of the machine, the gear 67 and cam 93 are given a half revolution as described and the notch 94 is brought beneath the other shifter-arm, so that its spring can move the clutch connected thereto into engagement with the corresponding shifter cam. At the same time, the other clutch which has been engaged with its shifter cam is moved out of engagement therewith against the tension of its spring 92. These parts thus serve to alternately connect the shifter mechanisms for the two magazines to the selecting knobs 34 and the selection by the user of the machine is always made from the full magazine, so that the one from which a record has been removed remains stationary until this record is returned thereto.

To aid the user of the machine in making his selection, each magazine is provided with a pointer 95 which coöperates with a suitable program card 96 (see Fig. 4) upon which the names of the different records are mounted. The full magazine from which the selection to be made is also indicated by a pair of pointers 97 mounted upon the carriage (see Figs. 4 and 4^a). The carriage occupies different positions at the opposite sides of the machine at the alternate operations of the machine, and the pointer which indicates the full magazine is exposed while the other pointer is hidden behind the program card 96.

The record on the turn-table is held in position by a center pin L (see Figs. 4, 7 and 8) that is mounted upon the inner end of a horizontal arm 7. This arm is fixed to the upper end of a vertically shifting-rod 7' which is guided in brackets 98 fixed to the upper, horizontal frame 1, the rear guide-rail 48 and the intermediate horizontal frame 3. The lower beveled end of this shifter-rod 7' engages a cam 99 (see Fig. 1) which is fixed upon the rear end of a horizontal shaft 100. This shaft is journaled in suitable depending brackets on the intermediate horizontal frame 3 and at its forward end is provided with a gear 101 (see Figs. 2 and 3) that meshes with the teeth of the gear 67 that is driven by the shifter motor. The pin L normally engages the central opening of the record on the turn-table but, when the shifter-motor starts its operation, the cam 99 is shifted in the direction of the arrow indicated in Fig. 1 and the shifter bar 7' is quickly lifted to thereby raise the arm 7 and pin L to the position shown in Fig. 8, so that the record on the table can be moved therefrom and the selected record from the full magazine moved

onto the table beneath the pin. At the end of the movement of the shifter mechanism, the cam 99 allows the bar 7' to drop by gravity and thereby bring the pin L into engagement with the record which has been brought to position on the turn-table B.

The records frequently vary slightly in size and to prevent the larger record from rubbing upon the arms *h* of the carriage H as it is rotated by the turntable, the carriage, after it has been shifted to place a record on the turn-table, is shifted slightly in the opposite direction by means of an arm 102 that is centrally pivoted upon the frame portion 7. A spring 103 connects one end of this arm to the frame and at the end of the movement of the carriage H toward the left, a lug 104 on the carriage engages the rear end of the arm and moves it against the tension of the spring 103. At this point, the roller on the crank-arm 54 moves over a high point in the cam slot 52 of the carriage shift-lever 50 and the spring 103 then acts through the medium of the arm 102 to move the carriage back slightly toward the right and thereby move the arm *h* of the carriage H away from the record on the turn-table. When the carriage is shifted in the opposite direction toward the right to move the record from the left-hand magazine, a lug 105 on one of the left-hand arms *h* engages the forward end of the arm or lever 102 and moves it against the tension of the spring 103. Then, after the roller on the crank-arm 54 has passed over another high point in the cam slot 52 of the shift-lever 50, the spring 103 acts to remove the carriage back slightly toward the left and thereby bring the arms *h* from contact with the record on the turn-table.

In view of the slight variation in the size of the different records, spring-centering devices are provided, so that the records when shifted back into the magazine will properly engage the stationary pins 44 and 45 when the magazines are thereafter shifted in vertical direction. These spring-centering devices preferably comprise a pair of coiled springs 106 (see Figs. 4 and 5) which extend between the upper and lower horizontal portions of the magazine frames *f*. These springs are so arranged that they will just touch the large records when the latter are in engagement with the pins 44 and 45. The throw of the carriage is such that it will move small records to central position on the magazine and will move large records slightly beyond the central position. The large records thus engage and compress the spring stops 106 slightly, but, when the carriage is moved back slightly by the spring-operated arm or lever 102, the springs 106 will shift these large records back to center position. At the same time, the spring stops or centering devices will serve to prevent

the displacement of the small records and insure that they be properly engaged by the pointed ends of the pins 44 and 45 when the magazines are shifted in vertical direction.

5 The sound-box M is mounted upon the forward end of a hollow arm *m*, and the rear end of this arm is socketed in a hollow elbow *m'*. This elbow (see Figs. 1, 4, 6, 7 and 8) is provided with a rearwardly-projecting, transversely perforated portion 107
10 which engages a horizontal guide-rod 108 that is fixed to one of the brackets 98 and to a bracket 109 that is fixed to the frame portion 7 and to a depending lug on the upper horizontal frame 1. A short arm or lever 110 is pivoted to the portion 107 on the elbow *m'* and extends between lugs 111 on the elbow and at its forward end is provided with a segmental nut *n* that engages
15 a feed-screw N. This feed-screw is journaled in suitable bearings on the frame portion 7 and is connected at one end by a pair of beveled pinions 112 with a vertical shaft 113 that is also journaled in suitable bearings upon the frame portion 7. The lower
20 end of the vertical shaft 113 is connected by a pair of beveled pinions 114 to a short, horizontal shaft 115 journaled in a suitable bracket 116 that is fixed to the frame portion 7. The inner end of this horizontal shaft 115 is provided with a pinion 117 that meshes with the gear 10 of the turn-table motor, so that the feed-screw N is rotated by the turn-table motor to propel the sound-box over the record on the turn-table as the
25 latter is rotated to thereby reproduce the record. A spring 118 is connected to the end of the arm 110 and to a lug on the elbow *m'* and this spring serves to suitably hold the segment nut *n* in engagement with the feed-screw N.
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The sound-box M, arm *m* and elbow *m'* are normally at one end of their movement with the sound-box adjacent the center of the
35 record. These parts are swung about the guide-rod 108 of the center to lift the sound-box into and out of engagement with the record by a bar or track 119 which is pivoted at one end to the arm *l* (see Fig. 4) and at its opposite end to a bracket 120 (see Fig. 7)
40 that depends from the upper, horizontal frame 1. This bar or track extends beneath a lug or anti-friction roller 121 on the under side of the arm *m* and near its free end, so that the sound-box is raised with the arm *l* at the beginning of the operation of the shifter mechanism. This movement also lifts the segment nut *n* out of engagement with the feed-screw, the arm 110 being at this
45 time held by the spring 118 against a stop 122 on the projecting portion 107 of the elbow *m'*. The sound-box and parts connected thereto are then free to be shifted to the outer edge of the record to commence the
50 reproduction thereof. This shift is effected

by an arm or lever 123 (see Fig. 6) which is pivoted at its lower end upon the rear portion of the supplemental frame 7 and having its upper end in position to engage the lug 107 on the elbow *m'*. The arm 123 has
55 a projecting tail-piece 124 that is connected by a spring 125 to a horizontal arm 126. This arm is pivoted at one end to the supplemental frame 7 and its other end rests upon a pin 127 on the vertically movable
60 shifter rod *l'*. At the beginning of the operation of the shifter motor, the shifter rod or bar *l'* is raised to thereby lift the center pin L and release the record on the turn-table and also to raise the sound-box from the
65 record. This shift of the bar *l'* lifts the arm 126 and places the spring 125 under tension. The arm 123 is not at once shifted by this spring but is held against movement by a bevel-edged lug 128 on the arm 126 which
70 engages a similar lug 129 on the arm 123. The latter is not shifted by the spring 125 until after the lug 128 passes by the lug 129 but, as soon as this occurs, the spring 125, which has been placed under considerable
75 tension by the vertical movement of the arm 126, shifts the arm 123 and moves the elbow *m'* along the guide-rod 108 and thereby shifts the arm *m* connected to the elbow and sound-box to the outer edge or beginning of
80 the record that is placed on the turn-table by the carriage H. At the end of the movement of the shifter mechanism and of the carriage H, the bar *l'* descends as described, and the sound-box is lowered onto the
85 record. The arms 126 and 123 are also returned to initial position. When the inner end of the bar or track 119 is lifted by the arm *l*, it is then inclined outwardly toward the outer edge of the record, so that the arm
90 *m* slides down this track as the elbow *m'* is pushed back by the arm 123 along the guide-rod 108.

When the sound-box is lowered onto the record at the end of the operation of the
95 shifter mechanism, the roller 121 on the arm *m* engages a spring finger 130 that is fixed to the lower end of the bracket 120 (see Figs. 4 and 7), this finger extends inwardly over the record and through a lug 131 on the
100 lower end of the bracket 120, and which lug is preferably slotted to engage the spring finger and hold it in position. The spring finger serves to uphold and partially counterbalance the arm *m* and sound-box M, so that the turn-table and record thereon can be started in their rotation and acquire sufficient momentum before the record receives the full weight of the sound-box. By this arrangement, the friction between the needle
105 or stylus of the sound-box and the record on the turn-table will not prevent the rotation of the turn-table. Moreover, this spring finger prevents the new needle, which is placed in the sound-box at each operation of
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the machine, from scratching the record. After the arm *m* passes from the spring finger, the turn-table has acquired sufficient momentum to properly rotate the record thereon and the point of the new needle has been sufficiently worn so that it will not injure the record.

When the sound-box is lowered into engagement with the record, the segment nut *n* engages the feed-screw N and the latter is driven by the operating motor, which also rotates the turn-table, so that the sound-box is propelled over the record and the needle or stylus thereon will enter and travel in the groove of the record to reproduce the same. The feed-screw positively propels the sound-box across the record and back to the end of its movement adjacent the center of the turn-table whatever may be the length of the groove of the record. When the sound-box has fully completed this movement, the operating motor therefor and for the turn-table is arrested by a stop-pin 132 on the chain 19 (see Figs. 3 and 7) which is used in winding the motor as described and which is driven thereby in reverse direction during its operation. At the end of the movement of the sound-box, this stop-pin 132 engages the end of an arm 133 pivoted on the supplemental motor frame 7 and lifts it, so that it is brought in engagement with and lifts the arm 25, the end of which bears upon the governor disk 24. This shift of the arm 25 causes it to bear with so much friction upon the disk 24 that the operating motor for the sound-box and turntable is brought to a standstill. The arm 133 also operates a small counter 134 mounted on the supplemental frame 7 to indicate the number of times that the machine has been operated.

As in the mechanism described in the prior application referred to, means are provided for preventing the operation of the shifter mechanism or in any way tampering with the operation of the machine while it is reproducing a record. For this purpose, means are provided for preventing the insertion of a coin which unlocks the machine and this device is controlled, as in the construction shown in the prior application, by a rod 135 connected by a spring 136 to the arm 132, and at the end of an operation, rod 135 is shifted so that the coin can be inserted and the machine again operated.

The end of the hollow arm *m* is arranged within an enlarged annular flange 137 on the elbow *m'*, and a heavy rubber washer 138 (see Fig. 12) is arranged within this flange and around the end of the hollow arm *m*. A flange 139 on the arm extends over the outer face of the washer and a pivot pin extends through the flange 137 and washer 138 and through the end of the arm *m*. This pin is vertically disposed and the whole forms a joint which will yield very slightly to per-

mit the sound-box to sway slightly in horizontal direction as it is propelled over the record by the feed-screw N. By this arrangement, the stylus or needle of the sound-box will follow the grooves of the record without binding or scratching thereon and the reproduction of the record will be clearer than if a rigid arm were employed.

The elbow *m'* is connected to an amplifying horn P by a swinging to comprising two telescopic sections *p*, *p'* (see Figs. 7 and 8). The elbow *m'* is provided with a head 141 which is in the form of a segment of a sphere and which fits within a correspondingly-shaped socket piece 142 upon the lower end of the tube section *p'*. The upper end of this tube section fits within the tube section *p* and carries a cross-bar 143 at its upper end. A pin 144 is fixed at its lower end to this cross-bar and extends loosely through a cross-bar 145 on the upper end of the tube section *p*. The upper end of the tube section *p* is provided with a head 146 which is in the form of a segment of a sphere, and which fits a correspondingly-shaped socket piece 147 on the lower end of the amplifying horn P that is supported by and projects above the top wall of the casing A. A spring 148 surrounds the pin 144 and presses against the cross-bars 143 and 145 on the telescoping tube sections *p*, *p'* and tends to force them apart, so that the joint between the lower tube section and the elbow *m'* and between the upper tube section and the amplifying horn are sound tight during the transverse shift of the sound-box over the record, and the sound waves will be properly conducted from the sound-box through the arm *m*, elbow *m'* and telescoping tube sections *p*, *p'* to the amplifying horn P, despite the variation in distance between the end of the elbow *m'* and the end of the amplifying horn, and in spite of any slight vertical vibrations of the arm *m* due to any irregularities of the record or turn-table whereon it is mounted. The nut *n* is always maintained in proper engagement with the feed-screw N by the spring 118 in spite of any vertical vibrations of the arm *m* and elbow *m'*. The telescopic tube sections *p*, *p'* can be readily removed when necessary by forcing them together against the pressure of the spring 148.

The sound-box M (see Fig. 11) is provided with a suitable holder *r* for the needle or stylus R. This holder is mounted upon a cross-bar 149 that is mounted between a pair of center point pivot screws 150 that are threaded to a pair of lugs 151 on the sound-box and provided with lock-nuts 152. An arm *s* connects the bar 149 to the diaphragm S of the sound-box. The needle R is held in place by a pivoted clamp *r'* that is forced against the needle by a spring

153 that is fixed to a pin 154 and engages the tail-portion 155 of the clamp r' . A tube t mounted on the sound-box, leads from a funnel t' at the other portion of the sound-box to the needle or stylus-holder r . This tube is cut away on one side and an ejector pin T operates through the cut-away portion of the tube to force out the used needle. This ejector is mounted upon the end of an arm 156 which is pivoted upon a forwardly-extending lug 157 on the sound-box. A spring 158 fixed at one end to the sound-box, engages a lug 159 on the arm 156 adjacent the pivot of the latter and normally holds the arm against the stop 160 on the sound-box with the needle ejector pin T withdrawn and in the position as shown in the drawings.

At the end of the operation of the machine, the sound-box is arrested in front of a cam U which is fixed to and depends from a bracket 161 on the upper horizontal frame 1. In this position, a roller 162 on the end of the projection or finger 157 of the sound-box is immediately below and between a pair of projecting flanges 163 and 164 on the cam plate U (see Figs. 8 and 13). When the machine is started in operation, the sound-box is lifted as described, but the coöperating lugs 128 and 129 on the arms 126 and 123, prevent the arm 123 from at once returning the sound-box, so that the roller 162 on the sound-box engages the flanges 163 and 164 of the cam-plate which guides the sound-box in vertical direction. As the sound-box thus moves upwardly from the position shown in Fig. 7, the tail 155 of the needle clamp r' strikes a projection 165 on the lower end of the cam-plate and is shifted against the tension of the spring 153 to release the used needle. There is always a new needle in the tube t resting on the used needle, and the further upward movement of the sound-box will bring the lug 159 on the arm 156 against a lug 166 on the cam plate and the ejector pin T will be projected into the tube t , striking the end of the new needle which rests upon the used needle so as to force out the used needle and project the new one into position to be engaged by the clamp r' . The cam lug 165 is sufficiently long to hold the needle clamp r' released until the new needle has been placed in position by the needle ejecting pin or finger T. As soon as the tail 155 passes the cam lug, the spring 153 restores the needle clamp to the position shown in the drawings and grips the new needle. Until this occurs, the new needle is held in place by a spring 167 mounted on the arm 149 and having its end in position to engage the needle in the needle support r . When the sound-box has been lifted to bring the roller 162 above the flange 163 and the parts 155 and 159 above the lugs 165 and 166 on the

cam-plate, the sound-box is shifted outwardly, as above described, to commence the record. Before this occurs, another needle is supplied to the tube t and rests on the needle in the holder r , so that the machine is ready for the next succeeding operation. This needle is supplied from a suitable magazine as presently described. If more than one extra needle is in the tube t , it will be removed through the cut-away portion of the tube when the sound-box strikes against the bracket 120 at the end of its outward shift.

As in the construction set forth in the prior application referred to, the needle magazine comprises a cage of hollow tubes V rotatably mounted upon a bracket 168 that rests upon the bracket 161 and detachably engages a pin 169 thereon. The tubes V are filled with needles placed one above the other with their points downward and as the cage is rotated the needles are discharged, one at a time, through an orifice 170 (see Fig. 10) into the funnel t' at the upper end of the needle tube t of the sound-box when the latter is raised into the position shown in Fig. 8. The needle magazine is rotated, one step at a time, to bring the tubes V successively over the opening 170 by a dog W which is pivoted to the arm l (see Fig. 8) and is arranged to coöperate with a series of ratchet teeth or fingers w formed on the lower portion of the rotatable needle magazine or case. The pawl dog W is held by a spring against a portion of the bracket 161 and at each operation of the machine, as the arm l is lifted, it acts upon the teeth or fingers w to advance the needle magazine one step. A pawl 172 pivoted upon the bracket 168, is held in engagement by a spring 173 with its ratchet teeth or arms w and serves to hold the needle magazine in position with one of the tubes V over the discharge opening 170 in the lower portion or plate of the bracket 168. Whenever a tube is brought over the opening 170, the lowermost needle is dropped therethrough into the funnel t' of the sound-box, thence through the tube and rests on the needle fixed in the needle-holder r . Only one needle drops from the magazine since the needle immediately above the lowermost needle over the opening 170 is held against discharge from the tube by a spring 174 that is fixed at one end to a pin 175 on the bracket 168 and extends between a pair of guide-plates 176 on the lower portion of the needle magazine and through slots in the tube V, so that it engages the next to the lowest needle in the tube over the opening 170 and prevents it from falling until after the tube has passed the opening 170. When this occurs, the lowermost needle rests upon the bottom plate 168 and is discharged therefrom through the opening 170 when

the tube is again brought in line with this opening.

When the needle magazine is empty, it is desirable to prevent the operation of the machine. For this purpose a lock-bar 177 is pivoted to the bracket 168 and is connected to one end of the spring 173. This lock-bar is arranged below the lower ends of the tube V, and the spring 173 holds it in engagement with the needle projecting therefrom and engaging the stationary bottom plate of the bracket 168. The lock-bar 177 is provided with a depending, pointed end portion or lug 178. Normally, this lug is held out of the path of movement of the sound-box and does not prevent its outward shift to commence the reproduction of a record. But if two adjacent tubes V of the magazine are empty, the spring 173 shifts the arm 177 inwardly and the pointed lug 178 thereon will so engage the funnel *t'* on the sound-box as to prevent the outward shift of the sound-box by the arm 123. The operating spring 125 of this arm will be placed under tension but it will fail to operate the arm. The proprietor of the machine will thus be notified that it is necessary to provide a new magazine full of needles or refill the old one in the machine.

The needles as they are projected from the sound-box, drop into a flanged cup or holder 179 on the lower end of an arm 180 that is connected by a pivot pin 181 to the rear face of the cam-plate U (see Fig. 8). The record-shifting carriage H is provided centrally with an upwardly projecting portion 182 (see Figs. 4 and 5) which, as the carriage is shifted, is adapted to strike the cup or used needle-holder 179 and tilts it about its pivot 181, so that the needle therein is dumped out through an opening 183 in its flange and into a chute 184 mounted on the carriage. This chute is inclined and leads to a cup 185 having an outturned lip at its upper edge that is perforated to detachably engage a pin 187 on the edge of the carriage H. The used needles are thus collected in the cup 185 and do not drop down into the operating mechanism of the machine. When this cup is full it can be removed and emptied.

In operating the machine, the user thereof will first make his selection from the full record-holder or magazine by turning the corresponding knob and thereby shifting the full magazine vertically through the medium of the shifter cam G and arm *g* until the desired record as indicated on the program card 96 is opposite the turn-table and within the arms of the carriage H. At this point it is clear of the pins 44 and 45. He will then release the winding crank D and shaft *d* through the medium of the coin-controlled mechanism and will turn this arm and shaft through one revolution

when it is again locked. This movement of the shaft *d* will wind up the operating motor E for the turn-table B and feed-screw N through the medium of the chain 19 and will place the shifter motor spring 62 under tension through the medium of the cam 63 and arm 60. The shift of the chain 19 will move the pin 132 away from the arm 133 and thereby release the operating motor. At the end of the upward movement of the arm 60, the lug 77 thereon will engage the tail-portion 85 of the catch 82 and release the stop-pin 72 and the lug 77 will also strike the lug 76 on the bell-crank arm 75 and thereby lift the locking pin 72 and dog 81 to thereby permit the operation of the shifter motor when the arm 60 is moved down by the shifter motor spring 62. The semi-circular cam flanges 80 coöperate with the dog 78 as described to permit a half revolution of the shaft 55 to thereby shift the carriage H through the medium of the arm 50 from one side of the machine to the other, and move the record on the turn-table back to its position in one of the record magazines and move the selected record from the full magazine onto the turn-table. The shaft 55 drives the cam 99 as described, and upon the initial movement of the shifter motor, the arm *l* and centering L are lifted to release the record on the turn-table. At the same time, the sound-box arm *m* is lifted and the lugs 165 and 166 on the cam-plate U operate upon the clamp *r'* and finger T to change the needle as described. The pawl W is also operated to advance the needle magazine one step and thereby deposit the new needle in the tube *t* of the sound-box. Upon the initial movement of the shifter rod *l'*, the arm 126 is raised to place the spring 125 under tension, but the arm 123 which shifts the sound-box is held against movement until after the lug 128 on the arm 126 passes the lug 129 on the arm 123. When this occurs, the spring 125 throws the shifter-arm 123 and thereby moves the sound-box back to begin the record. At the end of the operation of the shifter mechanism, the arm *l'* and parts connected thereto and operated thereby are restored to normal position, the center-pin L engages the record just placed upon the turn-table, the sound-box is lowered into engagement with the record and the nut *n* connected to the sound-box is lowered into engagement with the feed-screw N. The operation of the shifter mechanism is then arrested by the reengagement of the pin 72 with the fan governor J. The reproduction of the record is then begun. When the movement of the sound-box across the record is completed, the operating motor therefor and for the turn-table is arrested, as described, by the engagement of the pin 132 on the chain 19 with the arm 133 which presses the

governor arm 25 against the disk 24. At the same time, the rod 135 is operated to permit the insertion of another coin in the controlling mechanism so that the machine is ready for the next operation.

It is obvious that numerous details set forth can be changed and modified without departure from the essentials of the invention as defined in the claims.

I claim as my invention:—

1. In talking machines, the combination with record-rotating means and a reproducer, of a shifter for moving records to and from operative relation with said rotating means and said reproducer, shiftable means for holding the record in operative position, and means for moving said shifter out of contact with the records when the latter are in operative position, substantially as described.

2. In a talking machine, the combination with a turn-table and a reproducer, of a shifter for moving the records into and out of operative relation with said turn-table and said reproducer, means for operating said shifter to place a record on the turn-table, shiftable means for holding the record in operative position on said turn-table and means for giving said shifter a slight backward movement out of contact with the record on the turn-table, substantially as described.

3. In a talking machine, the combination with a horizontal turn-table, rotating means therefor and a reproducer, of a center pin coöperating with said turn-table to hold the records thereon, a shifter for moving the records to and from operative position on said turn-table, mechanism for successively operating said center-pin and said shifter, and independent means for moving said shifter out of contact with the record on the turn-table, substantially as described.

4. In a talking machine, the combination with a turn-table and a reproducer, of a shifter for moving records to and from operative position on said turn-table, an operating arm for said shifter, and a spring-operated arm for giving said shifter a slight backward movement at the end of its operation, substantially as described.

5. In a talking machine, the combination with a turn-table and a reproducer, of a sliding carriage for shifting records into and out of operative relation on said turn-table, a shifter-arm for said carriage, cam mechanism for operating said shifter-arm, and a pivoted spring-operated lever for giving said carriage a slight backward movement at the end of its operation, substantially as described.

6. In a talking machine, the combination with a turn-table, a reproducer and a record magazine, of a sliding carriage for shifting the records between said magazine and said

turn-table, motor driven mechanism for shifting said carriage and said reproducer, and means independent of said mechanism for giving said carriage a slight backward movement at the end of its operation to throw the same out of contact with the record on the turn-table, substantially as described.

7. In a talking machine, the combination with a turn-table and a reproducer, of a pair of record magazines arranged on opposite sides of said turn-table, a slide having parts for embracing a record on the turn-table and one of the records in one of said magazines, means for alternately shifting said slide in opposite directions at the succeeding operations of the machine to replace the record on the turn-table in its magazine and move a record from the other magazine onto the turn-table at each operation, and means for giving the slide a slight backward movement at the end of its operation to shift the same out of contact with the record on the turn-table, substantially as described.

8. In a talking machine, the combination with a horizontal turn-table, of a pair of vertically shiftable magazines on opposite sides of said turn-table, a sliding carriage having arms for embracing a record on the turn-table and a record in one of said magazines, cam mechanism for throwing said carriage alternately in opposite directions at the succeeding operations of the machine, and a spring-operated lever coöperating with abutments on the carriage for giving the latter a slight backward movement at the end of its shift in either direction, substantially as described.

9. In a talking machine, the combination with a horizontal turn-table and a reproducer, of a vertically shiftable magazine at one side of said turn-table, a sliding carriage for moving records between said magazine and said turn-table, a manually operated shifter for vertically adjusting said magazine to bring any one of the records thereof into position to be engaged by said carriage, a lever arm pivoted on the frame of the machine, means connecting the end of said lever arm to said magazine, a counterbalancing spring connected to said arm between its ends, and a screw connected to said counterbalancing spring for adjusting the tension thereof, substantially as described.

10. In a talking machine, the combination with a turn-table and a reproducer, of a record magazine shiftable to bring any one of the records thereon in line with said turn-table, means for preventing the displacement of all the records in said magazine except the one opposite said turn-table, a shifting part for moving the records between said turn-table and said magazine, and a

spring device for centering records of varying size in said magazine, substantially as described.

11. In a talking machine, the combination
5 with a horizontal turn-table and a reproducer, of a vertically shiftable record magazine on one side of said turn-table, a pair of stationary pins arranged to engage openings in the records in said magazine, the adjacent ends of said pins being spaced apart
10 to free the record in the magazine opposite the turn-table, a shifting slide for moving the records between said turn-table and said magazine, and resilient means for centering records of varying size in said magazine,
15 substantially as described.

12. In a talking machine, the combination with a horizontal turn-table and a reproducer, of a magazine on one side of
20 said turn-table vertically shiftable to bring any one of the records thereon in line with the turn-table, a pair of stationary pins for engaging central openings in the records in said magazine, the adjacent ends of said
25 pins being spaced apart to free the record in the magazine opposite the turn-table, a sliding carriage for moving the records back and forth between said magazine and said turn-table, and a pair of centering stop-springs against which the record is moved
30 by said carriage when it is returned to said magazine, substantially as described.

13. In a talking machine, the combination with record-rotating means and a turn-
35 table, of a record magazine, means for shifting the records back and forth between said magazine and said turn-table, means for shifting said magazine to bring any one of the records thereon in position to
40 be moved onto said turn-table, a manually operable part for actuating said magazine shifting means and an automatically operated clutch for connecting and disconnecting said shifting means and said part, sub-
45 stantially as described.

14. In a talking machine, the combination with a turn-table, of a record magazine shiftable to bring any one of the records
50 thereon in position to be moved onto said turn-table, a shifter for moving said records back and forth between said magazine and said turn-table, manually operable record selective means for shifting said magazine, and clutch mechanism for throwing
55 said selective means into and out of operation, said clutch mechanism being controlled by the movement of said shifter, substantially as described.

15. In a talking machine, the combination with a horizontal turn-table, of a record magazine on one side of said turn-table,
60 a shifter for moving the records back and forth between said magazine and said turn-table, manually operable record selective means for vertically moving said magazine

to bring any one of the records thereon into position to be engaged by said shifter, a clutch for throwing the record selective means into and out of operation, and mechanism for operating said shifter and for
70 controlling said clutch, substantially as described.

16. In a talking machine, the combination with a horizontal turn-table and a reproducer, of a pair of record magazines on
75 opposite sides of said turn-table, a shifting slide having parts for engaging a record on the turn-table and one of the records in said magazine, separate manually operable devices for vertically adjusting said mag-
80 azines to bring any one of the records thereon into engagement with said slide, clutches for alternately throwing said record selecting devices into and out of operation, and mechanism for operating said
85 slide and for controlling said clutches, whereby the full magazine can be shifted to select a record while the other from which a record has been removed, is held stationary until such record is returned
90 thereto, substantially as described.

17. In a talking machine, the combination with a horizontal turn-table, of a pair of record magazines on opposite sides of
95 said turn-table, a sliding carriage for shifting records between said magazines and said turn-table, said carriage being arranged to embrace a record on the turn-table and a record in one of said magazines, a pair of shifters for moving said record magazines
100 vertically to bring any one of the records thereon in line with said turn-table and into position to be engaged by said carriage, a pair of manually operable parts for operating said shifters, clutches for connecting
105 said parts and said shifters, a pair of shifter-arms for said clutches, and mechanism for alternately shifting said carriage in opposite directions at successive operations of the machine and for alternately
110 throwing said clutches into and out of operation through the medium of said clutch shifter-arms, substantially as described.

18. In a talking-machine, the combination with a horizontal turn-table and a reproducer, of a record magazine comprising
115 a vertical frame and a series of pairs of arms projecting inwardly from said frame arranged on one side of said turn-table for supporting a series of flat disk records, a pair of guide-rods for said frame, rollers
120 at the upper portion of said frame engaging the outer sides of said rods, rollers at the lower portion of said frame engaging the inner sides thereof, a counter-balance connected to said magazine, means for vertically adjusting the same to bring any record
125 thereon opposite said turn-table, and a part for shifting said record onto the turn-table, substantially as described.

19. In a talking machine, the combination with a turn-table and a reproducer, of a pair of magazines on opposite sides of said turn-table, a shifting part having means for embracing a record on the turn-table and one of the records in one of said magazines, means for alternately operating said shifting part at successive operations of the machine to move the record on the turn-table back into one of the magazines and to move a record from the other magazine onto the turn-table at each operation of the machine, selecting devices for shifting said magazine to bring any one of the records thereon into position to be engaged by said shifting part, means for preventing the movement of a magazine from which a record has been removed, indicators for the separate magazines and shiftable indicating devices for designating the full magazine from which the selection must be made, substantially as described.

20. In a talking machine, the combination with record rotating means and a reproducer, of a record magazine, shifter mechanism for moving the records back and forth between said magazine and said turn-table and for moving the reproducer to commence the record, an operating spring motor for said shifter mechanism, controlling stop devices for limiting the extent of movement of said shifter motor, a catch for said stop device and means for winding said motor arranged to successively release said catch and said stop device, substantially as described.

21. In a talking machine, the combination with a horizontal turn-table and a reproducer, of a record magazine, shifting mechanism for moving the records back and forth between said magazine and said turn-table and for moving the reproducer to commence the record, a main operating shaft for said shifter mechanism, a drum on said shaft having a pawl-and-ratchet connection therewith a cord coiled about said drum and connected thereto, a spring connected to one end of said cord, a pivoted lever connected to the other end of said cord, a motor-spring connected to said lever, a governor driven from said shaft, a stop engaging said governor, a controlling cam driven by said shaft and co-operating with said stop to limit the extent of movement of said shaft, a catch for said stop, a shifting arm whereon said stop is mounted, means arranged to engage said lever to wind up said motor-spring, and a lug on said lever arranged to successively release said catch and said stop at the end of the winding movement of said lever, substantially as described.

22. In a talking machine, the combination with a horizontal turn-table, a magazine for disk records and a shifter for moving the records back and forth between said magazine and said turn-table, of a reproducer, a

feed-screw for said reproducer, a motor for operating said feed-screw and said turn-table needle changing mechanism and shifter mechanism for moving said reproducer out of operative relation with said turn-table and said feed-screw and for moving the same to said needle changing mechanism and back to a position to commence the record and into reengagement with said feed screw, said screw serving to positively feed the sound box over the record and into position to engage said needle changing mechanism, substantially as described.

23. In a talking machine, the combination with a turn-table, of a record magazine, a part for moving the record back and forth between said magazine and said turn-table, means for shifting the magazine to bring any one of the records thereon into position to be engaged by said part, a reproducer, a feed-screw for said reproducer, a motor for operating said turn-table and said feed-screw needle changing mechanism and shifter mechanism for automatically operating said record-shifting parts and for moving said reproducer out of operative relation with said turn-table and said feed-screw into engagement with said needle changing mechanism and back to a position to commence the record, substantially as described.

24. In a talking machine, the combination with a horizontal turn table and mechanism for rotating the same, of a reproducer arm having a sound box on its inner end, a supporting member to which said arm is resiliently connected at its outer end to yield slightly in horizontal direction, a horizontal guide rod whereon said supporting member is pivotally and slidably mounted, a feed screw parallel to said guide rod and driven by said turntable operating mechanism, a segment nut movably mounted upon said supporting member and spring-pressed into engagement with said feed screw, said arm and supporting member being free to oscillate vertically on said guide rod during the reproduction of the record without disturbing the engagement of said nut with said screw, and a vertically movable track bar beneath said sound box arm for swinging the latter and said supporting member upon said guide rod, said supporting member having a part arranged to engage said spring held segment nut and hold the latter out of engagement with said feed screw when said reproducer arm is raised, substantially as described.

25. In a talking machine, the combination with a turntable and mechanism for rotating the same, of a reproducer arm having a sound box on its inner end, a horizontal guide rod whereon said arm is pivotally and slidably mounted at its outer end, a feed screw parallel to said guide rod and driven by said turntable operating mechanism, a

segment nut pivotally mounted upon the outer end of said reproducer arm, a spring extending between said nut and said arm for yieldingly holding the latter into engagement with said feed screw, and shifter mechanism for automatically lifting said arm and sound box, moving the same outwardly to commence a record, and for lowering the same into operative relation with the record, said arm having a lug arranged to engage said pivoted, spring-held nut to hold the same out of engagement with said screw when said reproducer arm is raised, substantially as described.

26. In a talking machine, the combination with a turntable and mechanism for rotating the same, of a reproducer arm having a sound box on its inner end, a supporting member to which said arm is resiliently connected at its outer end to yield slightly in horizontal direction, a horizontal guide rod whereon said supporting member is pivotally and slidably mounted, a feed screw parallel to said guide rod and driven by said turntable operating mechanism, a spring held segment nut on said supporting member arranged to engage said feed screw to propel said arm along said guide rod, a vertically movable track bar extending beneath said reproducer arm for raising and lowering the same, said supporting member having a part arranged to engage said spring held nut to hold the latter out of engagement with said feed screw when said arm is raised, a shiftable arm arranged to engage said supporting member to move said reproducer arm along said track bar when the latter is raised, and mechanism for operating said track bar and said shifter arm, substantially as described.

27. In a talking machine, the combination with a turn-table, of a hollow reproducer arm having a sound-box at its inner end, a feed-screw for propelling said arm transversely across the record, an amplifying horn, a connecting tube between said horn and said arm comprising two telescopic sections having ball and socket joints with said parts and having a spring tending to extend said sections, substantially as described.

28. In a talking machine, the combination with a turn-table, of a reproducer arm having a sound-box at its inner end, a needle-changing mechanism, a shifter for lifting said reproducer away from said turntable and into operative relation with said needle-changing mechanism, a shifter for moving said reproducer arm outwardly to commence the record, an operating spring for said second shifter arranged to be placed under tension by said first-mentioned shifter and means for retarding the operation of said second shifter until after said reproducer arm has been elevated by said first-mentioned shifter, substantially as described.

29. In a talking machine, the combination with a sound-box and a needle magazine, a needle clamp and an ejector finger mounted on said sound-box, a cam plate fixed to the frame of the machine and having parts arranged to release said needle clamp and operate said ejector finger, and means for elevating said sound-box to bring said needle clamp and ejector finger into operative relation with the parts of said cam plate, said elevating means having a part for effecting the discharge of a needle from said magazine, substantially as described.

30. In an automatic talking machine, the combination of a turn-table and a sound-box, of a needle magazine, means for automatically shifting said sound-box and for automatically changing the needles in said sound-box, a sliding carriage for changing the records arranged below said needle changing mechanism, a cup for containing the used needles mounted on said carriage and a device for collecting the used needles and discharging the same into said cup, substantially as described.

31. In a talking machine, the combination with a turn-table, and means for automatically changing the records thereon, of a sound-box, a needle magazine, means for automatically ejecting the old needle in the sound-box and providing the same with a new one from said magazine and for restoring said sound-box to commence the record, and means controlled by said magazine for preventing the operation of the machine when the magazine is empty, substantially as described.

32. In a talking machine, the combination with a sound box having a needle clamp, and an open-ended tube above said clamp adapted to hold a second needle, of an ejecting finger arranged to engage said second needle to force it into engagement with said clamp and eject the used needle, a cam plate for automatically and successively releasing said clamp and operating said ejecting finger, a spring for holding the new needle in position while the clamp is released, a needle magazine, and means for effecting the discharge of a needle therefrom through the open upper end of said tube, substantially as described.

33. In a talking machine, the combination with a turn-table, a sound-box movable over said turn-table, a needle clamp and an ejector finger mounted on said sound-box, a needle magazine mounted on the frame of the machine, a cam plate mounted on the frame of the machine and having parts arranged to release said needle clamp and operate said ejector finger, means for elevating said sound-box to bring said needle clamp and said ejector finger successively into operation with the parts of said cam plate and means for discharging a needle

dle from said magazine into said sound-box, substantially as described.

34. In a talking machine, the combination with a turn-table, of a sound-box movable
5 over said turn-table, a needle clamp and an ejector finger movably mounted on said sound-box, an open-ended tube on said sound-box above said needle clamp adapted to hold a second needle, a fixed cam plate
10 having parts arranged to release said needle clamp and operate said ejector finger, means for raising said sound-box to bring said needle clamp and ejector finger into operative relation with the parts of said cam plate, a
15 needle magazine, and means for effecting the discharge of the needle therefrom through the upper open end of said tube, substantially as described.

35. In a talking machine, the combination
20 with a turntable and a reproducer, of a pair of record magazines on opposite sides of said turntable, a shifter arranged to engage a record on the turntable and in one of said magazines, means for laterally moving said
25 shifter in opposite directions in succeeding operations of the machine to replace the record on the turntable in its magazine and move a record from the other magazine onto the turntable, and means for imparting to
30 the shifter a slight backward movement at the end of its operative movement in either direction to thereby move the same out of contact with the record on the turntable, substantially as described.

36. In a talking machine, the combination
35 with a horizontal turntable and a reproducer, a pair of record magazines on oppo-

site sides of said turntable, separate, manu-
ally operable devices for vertically adjust- 40
ing said magazines to select anyone of the records thereon, shifter mechanism for mov-
ing a record on the turntable into its maga-
zine and for withdrawing a record from
the other mechanism onto the turntable,
45 clutches for alternately throwing said manu-
ally operable, record selecting devices into
and out of operation, and means actuated
by said shifter mechanism for operating said
clutches to thereby permit the movement of
50 the full magazine to select a record and pre-
vent the movement of the other magazine
from which a record has been removed, sub-
stantially as described.

37. In a talking machine, the combination
with a turntable and a reproducer, of a pair 55
of magazines on opposite sides of said turn-
table, shifter mechanism for moving a rec-
ord from the turntable into one of said
magazines and for moving a record from the
other magazine onto said turntable, select- 60
ing devices for moving said magazines to
bring one of the records thereon into posi-
tion to be moved by said shifter mechanism,
means for preventing the movement of the
magazine from which a record has been re- 65
moved, and movable indicating devices ac-
tuated by said shifter mechanism for desig-
nating the full magazine from which a selec-
tion can be made, substantially as described.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

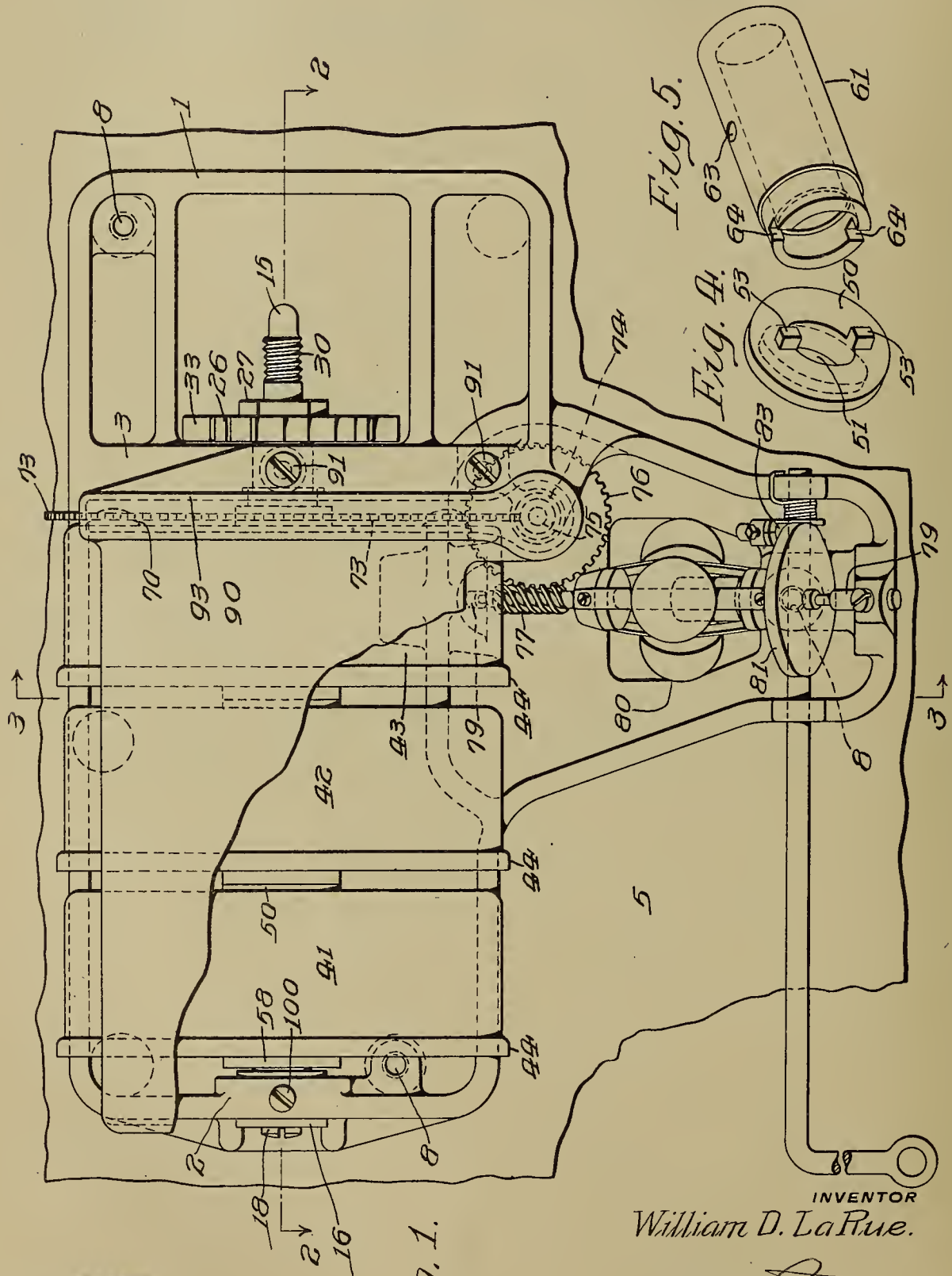
SPRING MOTOR FOR TALKING MACHINES
AND THE LIKE,

#1,182,576-----W. D. La Rue,
Patented-May 9th, 1916.
Filed-March 20th, 1913.

W. D. LA RUE.
 SPRING MOTOR FOR TALKING MACHINES AND THE LIKE.
 APPLICATION FILED MAR. 20, 1913.

1,182,576.

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 3 SHEETS—SHEET 1.



WITNESSES
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Fig. 1.

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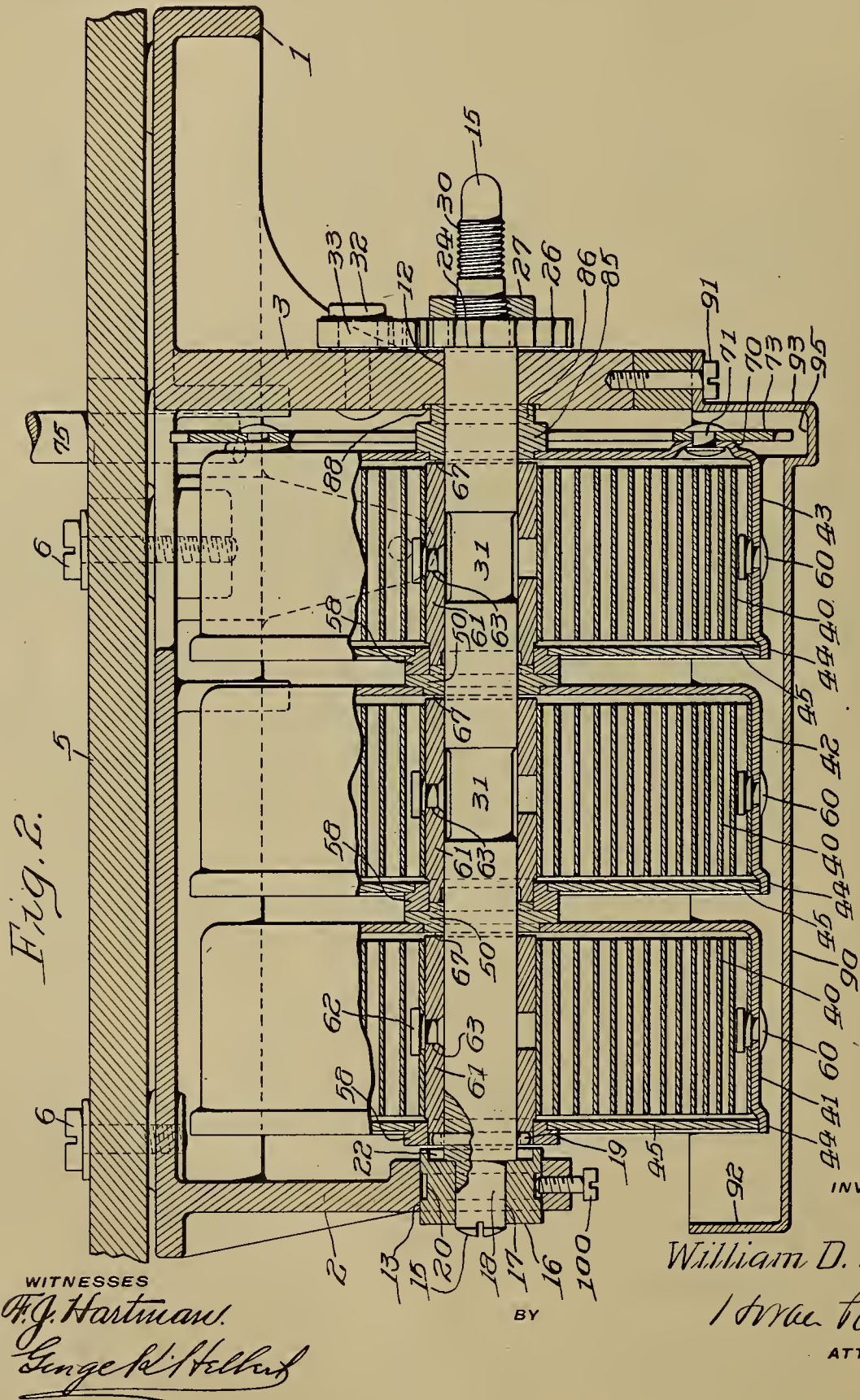
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ATTORNEY

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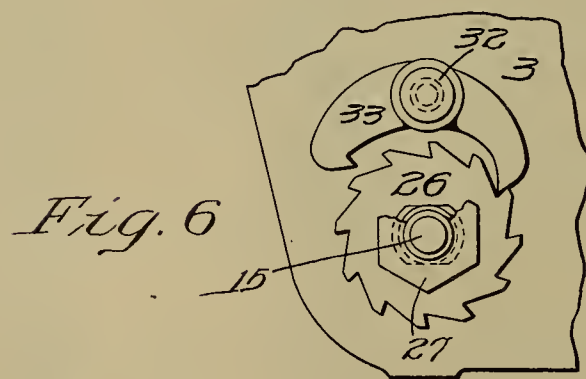
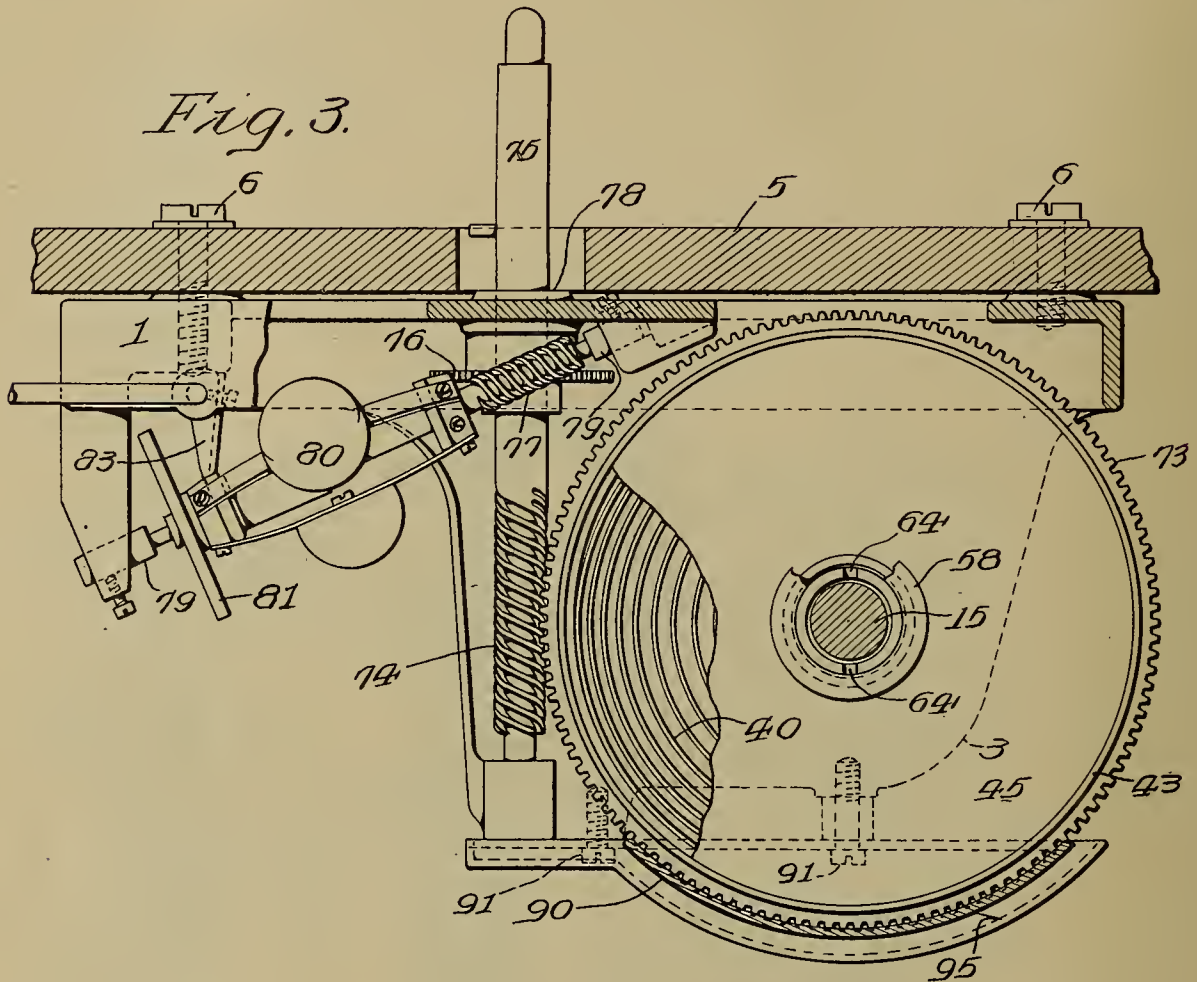
Patented May 9, 1916.
 3 SHEETS—SHEET 2.



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WILLIAM D. LA RUE, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SPRING-MOTOR FOR TALKING-MACHINES AND THE LIKE.

1,182,576.

Specification of Letters Patent.

Patented May 9, 1916.

Application filed March 20, 1913. Serial No. 755,579.

To all whom it may concern:

Be it known that I, WILLIAM D. LA RUE, a citizen of the United States, and a resident of Camden, county of Camden, State of New Jersey, have invented certain new and useful Improvements in Spring-Motors for Talking-Machines and the like, of which the following is a specification, reference being had to the accompanying drawings.

The principal objects of this invention are to provide a spring motor having a plurality of springs, each of which is incased in a separate spring barrel forming therewith a self-contained unit, said units being readily interchangeable; to provide a spring motor having a plurality of springs, which may be readily assembled or disassembled, and in which, in case of injury to or weakening of one or more springs, new springs, together with their associated parts may be readily substituted; and to provide a motor in which the various bearing surfaces are kept in constant alinement so that undue friction is minimized and the full power of the springs usefully exerted.

Further objects of this invention are to produce a motor of the type described, of simple and compact design having a minimum of parts, and which is noiseless in operation, which may be constructed at a minimum cost, and which may be taken apart and re-assembled in case of necessity without the employment of a skilled mechanic.

A further object is to provide a means for lubricating the principal gearing of such a motor which will seldom require attention.

Other objects and features of my invention will appear in the following specification, and the drawings forming a part of this application.

In the accompanying drawings, Figure 1 is an inverted plan view of a motor constructed in accordance with the principles of this invention, showing a portion of a cabinet to which it may be attached; Fig. 2 is a somewhat enlarged vertical longitudinal section thereof taken on the line 2—2 in Fig. 1, certain portions, however, being shown in elevation for the sake of clearness and other portions being omitted for the same purpose; Fig. 3 is a vertical transverse section taken on the line 3—3 in Fig. 1; Figs. 4 and 5 are perspective views of certain details of the motor; and Fig. 6 is a fragmentary elevation of a portion of one end

of the motor, showing a portion of the winding mechanism.

Referring to the drawings, one embodiment of this invention consists in a frame 1, which is provided with integral downwardly depending arms 2 and 3. This frame may be secured to the underside of a portion of a talking machine cabinet 5 by means of a plurality of screws 6 threaded into suitable apertures 8 in the frame 1, or it may be secured to the cabinet, or other object, in any other suitable manner.

The downwardly extending supports 2 and 3 are provided with preferably cylindrical apertures 12 and 13, the aperture 12 forming a bearing for the shaft 15 and the aperture 13 preferably forming a seat for the bushing 16. This bushing is preferably provided with a central cylindrical aperture 17 forming a bearing for the reduced portion 18 at one end of the shaft 15, and may furthermore be provided with an annular peripheral groove 20 for a purpose to be hereinafter described. One face of the bushing 16 may be provided with a hollow annular depression 22 surrounding the aperture 17, or the annular depression 22 may be omitted if desired. The shaft 15 is provided near the reduced portion 18 with a transverse pin 19, the ends of which project slightly beyond the periphery of the shaft for a purpose to be hereinafter described. The other end of the shaft 15 is journaled in the aperture 12 of the support 3, and extending through the said support, is preferably slightly reduced in diameter to form a shoulder 24. Upon this reduced portion of the shaft 15 is axially mounted a ratchet wheel 26 which is held in position abutting against the shoulder 24 by the nut 27 threaded on to the reduced portion of the shaft as shown in Fig. 2. The ratchet wheel 26 may be secured upon the shaft 15 in any desired manner which will prevent its rotation upon the shaft, but will permit of its being slid along the shaft and removed therefrom when the nut 27 is removed. One way of accomplishing this result is to mill off the sides of the reduced portion of the shaft so as to form slightly flattened surfaces in diametrically opposite relation, and to form the central aperture in the ratchet wheel 26 with correspondingly flattened surfaces, in the manner shown in Fig. 6, or any other suitable arrangement for effecting this desired result

may be adopted. The extreme outer end of the shaft 15 is formed with screw threads 30, or other suitable means for the attachment of a removable winding crank, not shown, and, if desired, the shaft 15 may be reduced in diameter at certain portions 31 of its length intermediate of its ends, as shown in Fig. 2, for a purpose to be hereinafter described. Pivoted to the support 3 by a suitable pivot 32 is a ratchet 33 which engages with the teeth of the ratchet wheel 26 in the ordinary well-known manner, to permit the said wheel, together with the shaft 15, to be rotated in one direction, but to prevent their rotation in the other.

The motive power of the spring motor is furnished by the expansion of a plurality of coiled springs 40. These springs of which there may be any number desired, are all wound in the same direction and are separately incased in cylindrical spring barrels 41, 42 and 43, conveniently cup-shaped and provided with a slightly annular off-set portion 44 around the periphery of its open end. A circular cover plate 45 forms a cover for each spring barrel, and is of such a diameter as to snugly fit within the off-set portion 44 where it is retained preferably by friction alone. Each of the spring barrels is preferably provided in the center of its closed end with a circular aperture in which is fixedly retained an annular clutch collar 50, best shown in Fig. 4, which is provided with a central cylindrical aperture 51 of a diameter adapted to form a good working fit upon the shaft 15, and with two or more outwardly projecting dogs 53, for a purpose to be hereinafter described. Upon the face opposite that from which the dogs 53 project, the clutch collars 50 are preferably provided with a somewhat reduced cylindrical off-set portion of approximately the thickness of the walls of the spring barrel and rigidly secured within the central aperture thereof. Each of the cover plates 45 is likewise provided with a similar central aperture in which is fixedly retained in a similar manner a collar 58 which is likewise provided with a slightly off-set cylindrical portion adapted to fit within the aperture, and with a central cylindrical aperture similar to the apertures 51 in the clutch collar 50 for a purpose to be hereinafter described.

Each of the spring barrels 41, 42 and 43 incloses a coiled spring 40, as previously stated, the outer end of which is attached thereto by means of a rivet 60, and the inner end of which is attached to a sleeve 61 by means of a rivet 62 in an aperture 63, or any other desired manner of fastening the ends of the spring may be employed instead of the rivets. The sleeves 61 which are all of identical construction, are provided with a central cylindrical longitudinal

aperture forming a good working fit upon the shaft 15. One end of each of these sleeves, which are best shown in Fig. 5, is provided with a plurality of recesses 64 adapted to receive the clutch dogs 53 upon the plates 50. It will be understood that while but two of these clutch dogs and a corresponding number of recesses are shown upon each collar and sleeve in the drawings, that any desired number may be employed. The other end of each of the sleeves is formed with a plane surface. If desired, the sleeves may be slightly reduced in external diameter at the end upon which the recesses 64 are located, as shown in Fig. 5, this reduced portion forming a snug working fit within the apertures already referred to in the collars 58.

It will thus be seen that when each of the spring barrels is assembled with the spring 40 within it and the cover plate 45 in place, that the sleeve 61 will lie centrally within the spring barrel, the end of the sleeve having the recess 64 projecting somewhat within the collar 58, and the other end of the sleeve being in contact with or extending to within a very short distance of the inner side of the collar 50, a very slight clearance space 67 being preferably left between it and the collar 50, this clearance being shown on an exaggerated scale in the drawings. It will be further understood, that each of the spring barrels, with its cover plate and their attached parts together with its corresponding spring, and its central sleeve, may thus be considered as in unitary relation, the whole being completely self-contained and forming a unit adapted to be inserted or withdrawn from the motor as such when desired.

The spring barrel 43, however, is formed preferably in a slightly different shape from the other spring barrels, it being preferably provided with a plurality of raised bosses 70, having suitable apertures for the accommodation of the rivets 71 by means of which a gear wheel 73 is fixedly attached to the spring barrel 43, being slightly off-set from the same by the bosses 70. This gear wheel may be attached to the spring barrel in any other manner desired, however, and can, if it be considered advisable, be arranged to be readily removed therefrom, although in the drawings, it is shown as permanently attached. This gear wheel, which is for the purpose of communicating the power developed by the springs to the gearing of the motor, preferably meshes with a worm 74 upon the main shaft 75 of the motor, said shaft being suitably journaled in the frame 1 and carrying a gear 76, which in turn meshes with a worm 77. The upper end of the main shaft 75 extends through a bearing 78 in the frame 1 of the motor and is continued upward as shown in

Fig. 2, passing through the cabinet 5 for the purpose of carrying a turntable or other device, not shown. The shaft carrying the worm gear 77 is journaled in the frame 1 in journals 79, and is provided with a centrifugal governor 80, carrying a longitudinally movable friction disk 81, the travel of which along the shaft is controlled by the movable friction brake 83, in a well known manner.

The spring barrel 43 further differs from the spring barrels 41 and 42, in that it is provided with a slightly modified form of collar 85 from which the clutch dogs 53 are omitted. In place of these dogs, the collar is provided with a cylindrical extension 86 adapted to enter a shallow annular recess 88 in the support 3, and to bear against the bottom of the said recess, a good bearing surface being formed between the end of the cylindrical extension 86 and the bottom of the recess 88.

A drip pan 90 is preferably attached to the lower portion of the support 3 by means of the screws 91, or in any other desired manner, and extends beneath the several spring barrels of the motor. This pan may preferably be curved concentrically with the spring barrels, and may be provided with end portions 92 and 93, the whole forming a sort of trough-shaped device. That portion of the pan beneath the gear wheel 73 is preferably of a slightly greater radius of curvature than the balance of the pan, so that a groove 95 is formed beneath the gear wheel for the purpose of containing vaseline or other lubricant into which the gear wheel 73 dips as it rotates. Both the gear wheel 73 and the worm 74, are thus kept constantly lubricated, it being only necessary to renew the supply of vaseline at infrequent intervals in order to insure this result.

When it is desired to assemble the motor, the main shaft 75, and speed controlling means being in place upon the frame, the various spring units, each comprising its spring barrel and cover with their attached parts, its sleeve and its spring, are placed in any desired order, excepting that the spring unit having the gear wheel 73 should be nearest the support 3, and are rotated until the clutch dogs 53 of the several units enter the corresponding apertures 64 in the several sleeves, as shown in Fig. 2. The spring units, being held in this interlocked position, are then slipped between the depending portions 2, and 3, of the frame 1 and the shaft 15 inserted through the aperture 13 in the support 2 and through the apertures in the several sleeves, its right hand end, considering Fig. 2, finally passing through the aperture 12 in the support 3. In this position, the transverse pin 19 in the left hand end of the shaft will enter

the recesses 64 in the end of the sleeve within the left hand spring unit, as shown in Fig. 2. The bushing 16 is then inserted in the aperture 13 and moved longitudinally along the reduced portion 18 of the shaft until it contacts with the shoulder formed by the reduced portion, in which position it is secured by means of the set screw 100, which is threaded into the support 2 and enters the annular groove 20 of the bushing.

It will thus be understood that beginning with the left hand spring unit, considering Fig. 2, each spring barrel is held in fixed interlocked relation with the sleeve contained in the next adjacent spring unit, and that the sleeve contained in the left hand spring unit is held in fixed relation with the shaft 15, by the protruding ends of the pin 19 engaging within the recesses 64 provided in the end of its sleeve. Furthermore, the spring units are restrained from substantial longitudinal movement along the shaft 15 by the transverse pin 19, and by the contact of the end of the cylindrical extension 86 of the collar 85 with the bottom of the recess 88, while the shaft 15 is also restrained from substantial longitudinal movement in one direction by the contact of the bushing 16 with the shoulder formed on the shaft 15 by its reduced portion 18, and in the other direction by the contact of the transverse pin 19 with the sleeve contained in the left hand spring unit.

The shaft being thus fixed in position, the ratchet wheel 26 is slipped over the end thereof, and turned so that the flattened surfaces of its central aperture register with the similar surfaces upon the shaft 15, and the nut 27 may then be screwed into position, thus binding the ratchet wheel firmly upon the shaft 15. The pan 90 may then be attached by the screws 91 and the groove 95 filled with lubricant. By the attachment of a winding crank to the shaft 15 by means of the threads 30, or in any other suitable manner, the shaft may be rotated in one direction, rotation in the other direction being prevented by the engagement of the ratchet 33 with the teeth of the ratchet wheel 26 in the well-known manner. The rotation of the shaft will immediately cause the rotation of the sleeve within the left hand unit owing to the contact of the transverse pin 19 with the clutch recesses in said sleeve. Such rotation will cause the spring within the spring barrel 41 to be wound up and, as this spring gathers power, the sleeve within the next unit having the spring barrel 42, will in turn be rotated through the engagement of the clutch dogs 53 upon the clutch collar 50, with the clutch in that sleeve, thus winding the spring within the spring barrel 42, and, in turn, the spring within the next unit having the spring barrel 43 will also be wound up in a similar manner. Of

course, it will be understood that during this winding process, the spring barrel 43 does not revolve, the teeth of the gear wheel 73 in mesh with the worm 74 preventing the movement of the barrel. However, when the speed controlling means 83 or other braking means employed are released and the motor permitted to run, the expansion of the spring within the spring barrel 43 will cause the said barrel to revolve together with the gear 73, communicating motion to the worm 74, the rate of which motion is controlled by the governing mechanism in a well known manner. The spring barrel 42 will also thus begin to revolve, but at a slower rate than does the spring barrel 43, and consecutively the spring barrel 41 will revolve but at a still slower rate. The shaft 15 does not revolve except when the motor is being wound, which operation may be carried on while the motor is running, if desired, but nevertheless, serves to keep the various moving parts in constant and perfect alinement, preventing distortion and minimizing friction.

The friction between the revolving sleeves contained in the spring barrels 42 and 43 and the shaft 15 may be somewhat reduced by decreasing the diameter of the shaft through a considerable portion of the length of its contact with the said sleeves, as at 31, as clearly shown in Fig. 2, or, if desired, the shaft may be made of a constant diameter.

If it be desired to dismantle the motor, the same may be very readily accomplished by a practical reversal of the assembling process. The drip pan 90 is first removed by withdrawing the screws 91, and the nut 27 having been removed, the ratchet wheel 26 may be readily slipped off the shaft. The set screw 100 is next loosened and the bushing 16 removed, after which the shaft 15 may be withdrawn, and all the spring units lifted from between the supports 2 and 3 and separated, leaving each unit with its associated parts entirely independent of the other units.

It will thus be seen that a motor of a construction similar to that described, may be very readily assembled or disassembled and that such labor does not require the services of a skilled mechanic. Furthermore, in case of injury to any one of the spring units, the same may be entirely removed from the motor and a new unit inserted without the necessity of sending the whole motor away for repairs, and since the springs are contained within dust proof barrels lubricant may be introduced between the coils of the springs at the factory, which will serve to lubricate them for a long period of time, while the principal gearing of the motor may be readily lubricated by the periodical introduction of vaseline within the groove 95.

Of course it will be understood, that while

I have illustrated the motor as having three spring units, any number of spring units may be employed, one of the principal advantages of my invention residing in the fact that large quantities of the spring units may be manufactured and later used without alteration in the construction of motors having frames and shafts designed for use with two, three, four or more units as desired.

A further advantage of a motor constructed in accordance with this invention consists in the use of a unitary frame therein, which frame can be readily formed as an integral whole, dispensing with the necessity, as in motors previously constructed, of attaching one or more of the portions thereof by mechanical means, which portions frequently have to be removed in assembling or disassembling the motor. The numerous advantages arising from the ability to make use of such a unitary frame construction will be at once apparent.

Furthermore, I do not desire to limit my invention to the precise details of construction and arrangement which have been herein set forth, as it is obvious that various modifications in the structure and arrangement of the various parts may be made therein without departing from the essential features and scope of the invention as defined in the appended claims.

Having thus fully described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. In a spring motor, the combination of a winding shaft, separate spring units movably mounted on the shaft, clutches connecting the adjacent spring units and movable into and out of engagement in the direction of said shaft, means for holding said units against movement longitudinally of the shaft and means for transmitting the motion of said units to a main shaft.

2. In a spring motor, the combination of a series of separate spring units, separable interlocking means connecting the adjacent spring units and movable into and out of engagement by the independent movement of one of said adjacent units relative to, in contradistinction to about, the axis of said series of units, and a central winding shaft removably inserted through said series of units and holding the same against movement relative to said axis.

3. In a spring motor, the combination of a shaft, separate sleeves mounted on the shaft, a power spring connected to each of the separate sleeves, spring barrels connected to each of the respective springs, and clutches forming interlocking connections between the sleeve of each spring and the barrel of the next adjacent spring.

4. In a spring motor, the combination of a shaft, separate spring units movably mounted on the shaft, clutches forming interlock-

ing connections between adjacent spring units, and means for holding the shaft in operative position.

5 5. In a spring motor, the combination of a shaft, separate spring barrels rotatably mounted on the shaft, springs within the spring barrels, a sleeve within one of said barrels and independently rotatable on the shaft and connected to the corresponding
10 spring, and interlocking clutch means provided respectively on one end of said sleeve and on the face of the adjacent spring barrel.

6. A power unit for spring motors, including a spring barrel open at one end and
15 closed at the other end, a cover plate for the open end of the barrel, said cover plate and the closed end of the barrel being formed with substantially central alining apertures, a sleeve within the barrel independently ro-
20 tatable thereof and adapted to register and communicate with said apertures, a power spring connecting the sleeve and the barrel, the sleeve being journaled at one end in one of said apertures, and a clutch member pro-
25 vided at said end of the sleeve.

7. A power unit for spring motors, including a spring barrel open at one end and closed at the other end, a cover plate for the open end of the barrel, said cover plate and
30 the closed end of the barrel being formed with substantially central alining apertures, a sleeve within the barrel rotatable independently thereof and adapted to register and communicate with said apertures, a
35 power spring connecting the sleeve and the barrel, the sleeve being journaled at one end in one of said apertures, a clutch member provided at said end of the sleeve, and a clutch member provided adjacent the other
40 aperture.

8. A power unit for spring motors including a spring barrel open at one end and closed at the other end, and formed in its closed end with a substantially central aper-
45 ture and with a clutch member located adjacent said aperture, a cover plate for the open end of the barrel, having a substantially central bearing opening alining with said aperture, a sleeve within said barrel
50 rotatable independently thereof and adapted to register with said aperture, the sleeve being provided at one end with a clutch member and being journaled at said end within the bearing opening and a power
55 spring connecting the sleeve and the barrel.

9. In a spring motor, the combination of a plurality of separate spring units, each provided with a central independently ro-
60 tatable sleeve, a shaft removably inserted through all of said sleeves, clutch members for connecting the sleeve of a terminal unit to the shaft, and means including clutch members on remaining sleeves, for coupling adjacent spring units.

65 10. A spring motor, including separate

spring units, each provided with an inde-
pendently rotatable central sleeve, a shaft
positioned through all of said sleeves, and
means including clutch members on said
sleeves, for coupling adjacent spring units. 70

11. In a spring motor, the combination of a plurality of separate spring units, each provided with a central sleeve rotatable in-
dependently thereof, a central shaft through
75 the sleeves, means for connecting the sleeve of a terminal unit to said shaft, the shaft being removable from the remaining sleeves, and means including clutch members on the remaining sleeves, for coupling adjacent
80 spring units.

12. The combination in a multiple spring motor having a series of spring units, of a gear mounted on one of said units and a pan provided with a lubricant retaining
85 groove extending beneath said units, said gear being adapted to revolve partially within said groove.

13. The combination in a multiple spring motor having a series of spring units, of a gear mounted upon one of the terminal units
90 of said series and a pan provided with a transversely extending lubricant retaining groove, said gear being adapted to revolve partially within said groove.

14. In a spring motor, the combination of
95 a plurality of separate spring units, clutches forming interlocking connections between adjacent spring units, a central shaft removably inserted through all of said spring units, a separable interlocking connection be-
100 tween said shaft and a terminal spring unit, and means for holding said shaft from longitudinal movement.

15. In a spring motor, the combination of a motor frame including a base and sup-
105 porting arms projecting therefrom, and provided with alining bearings, a plurality of spring units having freely separable connections interposed between said arms, and a shaft passing through said units and sup-
110 ported in said bearings and freely removable axially from said parts.

16. In a spring motor, the combination of a plurality of spring units, freely separable
115 connections therebetween, a central shaft removably inserted through all of said units, a separable interlocking connection between said shaft and a terminal spring unit, and means for retaining said shaft against with-
120 drawal from operative position.

17. In a spring motor, the combination of a motor frame including a base and sup-
125 porting arms projecting therefrom, said arms being provided with alining bearings, a plurality of separate spring units interposed between said arms, separable operative connections between adjacent spring units, a central shaft passing through all of said units and supported in said bearings and removable axially from position. 130

18. In a spring motor, the combination of
a motor frame including a base and sup-
porting arms projecting therefrom and inte-
gral therewith, said arms being provided
5 with alining bearings, a plurality of spring
units having freely separable connections in-
terposed between said arms, and a shaft
passing through said units and supported
in said bearings and freely removable ax-
10 ially from said parts.

19. In a spring motor, the combination of
a shaft, separate spring units movably
mounted on the shaft, freely separable in-

terlocking connections between adjacent
spring units, and means for holding said 15
spring units in operative position on the
shaft with said connections in interlocking
engagement.

In witness whereof, I have hereunto set
my hand this 19th day of March, A. D. 20
1913.

WILLIAM D. LA RUE.

Witnesses:

FRANK B. MIDDLETON, Jr.,
JOHN D. MYERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

~~GRAPHIC RECORDING APPARATUS~~

APPARATUS FOR RECORDING AND RE-
PRODUCING MOTION AND SOUNDS,

1,182,897-----Thomas A. Edison,

Patented-May 16th, 1916.

Filed-February 8th, 1908;

T. A. EDISON.

APPARATUS FOR RECORDING AND REPRODUCING MOTION AND SOUNDS.

APPLICATION FILED FEB. 8, 1908.

1,182,897.

Patented May 16, 1916.

2 SHEETS—SHEET 1.

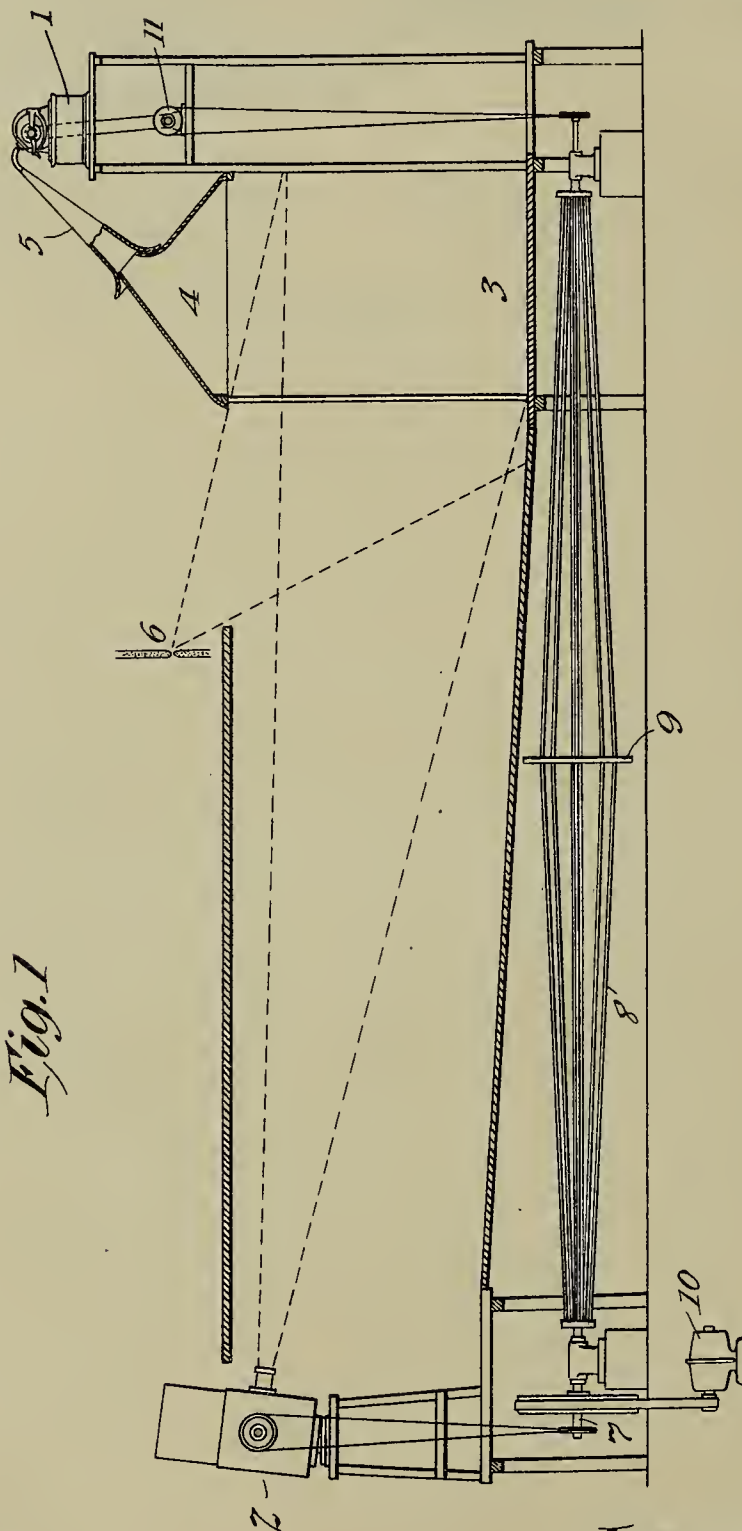


Fig. 1

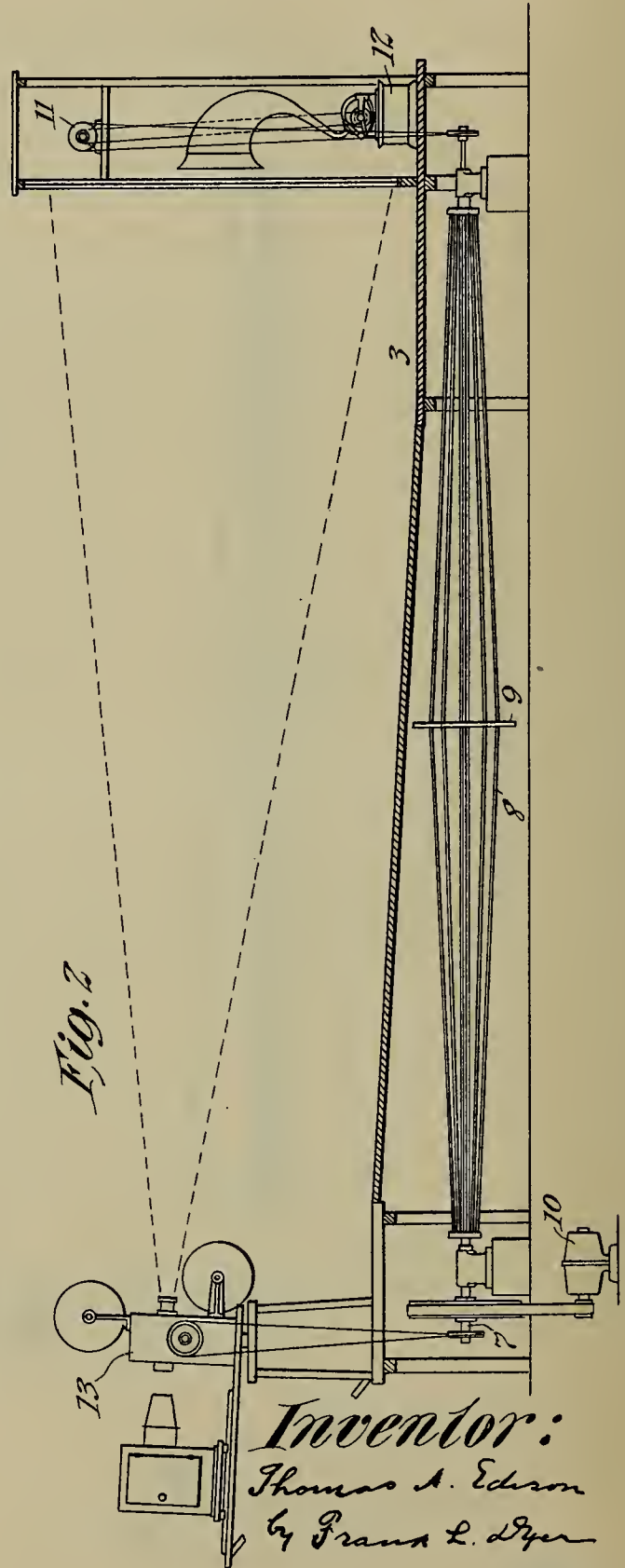
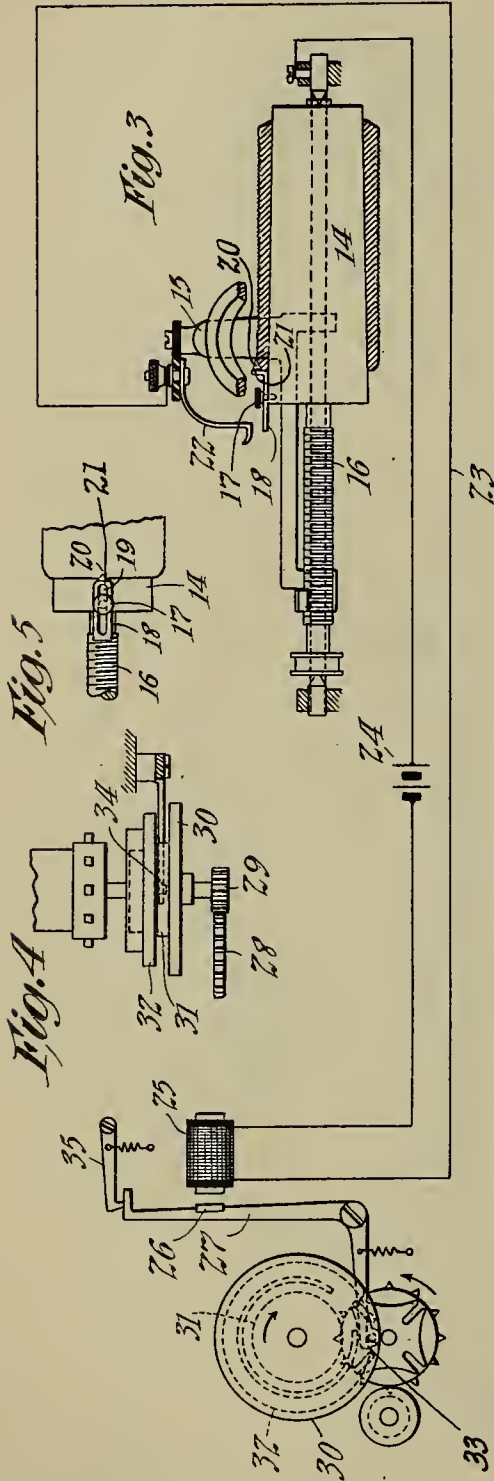
Witnesses:
Frank D. Lewis
Herbert H. Dyke

Inventor:
Thomas A. Edison
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Atty.

T. A. EDISON.
 APPARATUS FOR RECORDING AND REPRODUCING MOTION AND SOUNDS.
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1,182,897.

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 2 SHEETS—SHEET 2.



Witnesses:
 Frank D. Lewis
 Herbert H. Dyke

Inventor:
 Thomas A. Edison
 by Frank L. Dyer
 Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR RECORDING AND REPRODUCING MOTION AND SOUNDS.

1,182,897.

Specification of Letters Patent.

Patented May 16, 1916.

Application filed February 8, 1908. Serial No. 414,924.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Recording and Reproducing Motion and Sounds, of which the following is a description.

10 In the representation of animate motion by means of moving pictures, much of the effect of the original portrayal is lost by reason of the fact that the scenes are represented in pantomime merely, without the
15 sound which accompanied them when originally produced. For this reason the choice of subjects for representation by means of moving pictures is limited as only such subjects can be successfully represented in this
20 manner as are accompanied by very little sound, scenes in which sound plays a prominent part being incapable of adequate representation to an audience by the mere pantomime exhibition of moving pictures.
25 Likewise, the choice of subjects to be recorded and later reproduced by the phonograph alone is practically restricted to acts and scenes which are accompanied by little or no motion. The adequate portrayal of
30 the great majority of acts and scenes in which both action and sound are present, as for example, the popular "song and dance" act, or the delivery of a public speech by a speaker who talks and moves about and
35 makes gestures at the same time, cannot be accomplished by either the moving picture machine alone or by the phonograph alone, but only by the simultaneous use of both of these machines.

40 In order to simultaneously make a moving picture negative and phonograph record of an act or scene during its performance, the camera must be placed at a distance equal to substantially its normal focusing distance
45 from the scene, as will be understood, and the recording phonograph must be placed in the immediate neighborhood of the scene being performed so that the sound may be readily collected and conducted to the re-
50 cording device. Likewise, to secure the realistic reproduction of a scene or act by means of both the moving picture machine and the phonograph, the sounds must appear to emanate from the screen upon which

the moving picture is being exhibited and 55 for this reason the phonograph must be placed in the neighborhood of the screen—usually behind it—so that both in making the original record and negative and in reproducing the act or scene, the two machines 60 are separated by a considerable distance, substantially equal to the normal focusing distance of the camera or projecting machine.

As each movement portrayed upon the 65 screen must be accompanied by the sound originally produced simultaneously therewith, it is necessary that at some time, either at the beginning of the operation of the picture machine and phonograph, or shortly 70 thereafter, the two machines shall be made to reproduce movements and sounds which were originally produced at the same instant, and this same identical relation must be maintained throughout the entire repro- 75 duction of the performance by the two machines. It has been proposed heretofore to synchronize the operation of the picture machine and the phonograph by actuating these machines by means of synchronized 80 electric motors, but such devices are uncertain in operation and likely to get out of order, are extremely expensive and have not been found to produce practical results.

The object of the present invention is to 85 provide a novel process and apparatus for making simultaneously a moving picture negative and a phonograph record of sound producing objects in motion and thereafter simultaneously reproducing the sounds re- 90 corded by the phonograph and exhibiting the objects in motion by means of moving pictures, the apparatus which I have devised for this purpose being simple and inexpensive to manufacture and certain and reliable 95 in its operation.

In a device constructed and operated in accordance with my invention, a simple mechanical form of driving mechanism is provided to drive both the phonograph and the 100 moving picture camera or projecting machine, according as the device is to be used for recording or reproducing acts and scenes. The form of drive which I have found best adapted for this purpose com- 105 prises a long shaft whose length is substantially equal to the distance between the two machines and which may be arranged in

any convenient location, as for example, beneath the floor of the room, the phonograph being driven from one end of this shaft and the moving picture camera or projecting machine from the other. If the location of the device is such that a single, straight shaft cannot be used, shorter shafts geared together by bevel or other gears or connected together by universal joints may be used, as will be understood. The shaft may be driven from any convenient source of power, as for example, from an electric motor.

In accordance with my invention, either in making the original record and negative, or in the reproduction of the scene or act, either the phonograph or else the moving picture camera or projecting machine, as the case may be, is first set into operation and the remaining machine is automatically set into operation therefrom. I prefer and have here illustrated the moving picture camera or projecting machine as being started from the phonograph. I consider this the preferable arrangement because the intermittently operating mechanism of the moving picture camera or projecting machine is practically without mass and may be started or stopped substantially instantaneously. With this arrangement I preferably provide means whereby when the recording or reproducing stylus of the phonograph has been carried by the carriage moving transversely of the phonograph record, to a determinate distance from the end of the phonograph record cylinder, the moving picture camera or projecting machine will be automatically set into operation. The operation of the mechanism for this purpose which will hereafter be fully described, is independent of any variation in the longitudinal position which the record cylinder may occupy on the phonograph mandrel. I also provide means whereby the angular position of the master record upon the mandrel of the phonograph, during the making of the original record, is indicated, and thereby the record or duplicates thereof may be replaced upon the said mandrel in precisely the same angular relation thereto as originally existed between the master record and the mandrel.

In order that my invention may be more clearly understood, I have shown in the accompanying drawings apparatus by which my improved process may be carried into effect.

In the figures of the drawing, wherein the same reference numerals are used uniformly to designate the same parts throughout, Figure 1 is a view, partly in longitudinal vertical cross-section, of an apparatus for simultaneously making a moving picture negative and a phonograph record; Fig. 2 is a view similar to Fig. 1 but showing a moving picture projecting machine

and a reproducing phonograph instead of a moving picture camera and a recording phonograph respectively; Fig. 3 is a diagrammatic view of one form of means for setting one of the machines into operation from the other, the moving picture camera or projecting machine being here shown as set in operation from the phonograph, and Figs. 4 and 5 are detail sectional views of portions of the moving picture camera or projecting machine and the phonograph respectively.

Referring to Fig. 1 of the drawings, a recording phonograph is shown at 1 and a downwardly directed moving picture camera at 2. The phonograph is situated in the immediate neighborhood of the stage 3, preferably behind and above it. Immediately above the stage is provided a funnel 4 which collects the sound and conducts it into the receiving horn 5 of the phonograph. The phonograph 1, funnel 4, and horn 5, are all preferably located without the field of the camera, as shown in Fig. 1. Other means for collecting the sound and conducting it to the phonograph may of course be used. The stage 3 is illuminated from a source of light 6. A long drive shaft 7 is used to drive both the camera and the phonograph and it extends from the neighborhood of the phonograph to the neighborhood of the moving picture camera, and may be placed in any convenient position, as for example, in the construction shown in the drawing, it is placed beneath the floor of the room. This shaft is mounted in bearings at either end and in order to give it rigidity, render it substantially non-torsional and at the same time make it as light as possible, it may be provided with a number of stays 8 which are secured to the shaft near its ends and are held apart near the middle of the shaft by a plate or frame work 9. Any form of light rigid shaft may be used, however, as for example, the compound shafting shown in my patent No. 271,614 dated February 6, 1883. The shaft 7 is driven from any convenient source of power, as for example, an electric motor 10, the speed of which is regulated in any suitable way so as to be always uniform, as for instance in the regulation of electric motors for operating phonographs; and the motor is several times more powerful than is necessary for driving the load, in order that its speed may not be momentarily checked when the moving picture machine is instantaneously started, as will be explained. One end of the shaft 7 is connected up to drive the moving picture camera or projecting machine and the other end the phonograph. The power is preferably transmitted from the shaft through sprocket chains and sprocket wheels, so that all possibility of slip may be obviated, although it

is obvious that pulleys or gears might be used. The proportions of the power transmitting devices are such that the moving picture camera or projecting machine and the phonograph is each operated at its own proper speed. In transmitting the power to the phonograph a counter-shaft 11 is preferably provided so that the phonograph may be placed in slightly different positions as shown in Figs. 1 and 2.

Referring now to Fig. 2, 12 represents a reproducing phonograph and 13 a moving picture projecting machine. The driving apparatus for these two machines is the same or precisely like that for the recording phonograph and the moving picture camera, so that when the two machines have once been gotten to working in unison they will continue to operate in unison and the sounds and motions will be reproduced simultaneously as they were originally produced.

The mechanism for automatically setting the moving picture camera into operation from the recording phonograph and for setting the moving picture projecting machine into operation from the reproducing phonograph, is shown in Fig. 3. In this view 14 represents the phonograph mandrel, 15 the carriage which is movable transversely of the phonograph mandrel and the cylindrical blank or record thereon, under the control of the rotating feed screw 16. These parts are of ordinary construction. The carriage 15 carries a recorder when the instrument is used for recording and a reproducer when it is to be used for reproducing, as will be understood. Near the larger end of the mandrel 14 and adjustably secured thereto by means of a screw 17 is a small bracket 18 provided with a longitudinal slot 19 through which the screw 17 is passed. The end of this bracket next to the record or blank cylinder is formed with a sharp edge 20 and an upward projection 21 forming a contact point. Secured to the carriage 15, and insulated therefrom, is a contact piece 22. This contact piece may be made of light metal so that it may be easily adjusted by bending; or other means for adjusting it may be provided. The branches of an electric circuit 23 are connected respectively to the mandrel 14 and the contact piece 22, so that when the contact piece 22 strikes the extension 21 of the bracket 18, the circuit will be closed. This circuit includes the coils of an electromagnet 25. The armature 26 of the magnet 25 is carried upon a lever 27 here shown as a bell-crank lever, forming a part of the device used when the electric circuit is closed as above described, to set into operation the moving picture camera or projecting machine, a sectional plan view of which is shown in Fig. 4. 28 indicates a gear wheel operatively connected to the shaft 7 and meshing with a pinion 29, which operates to

continuously rotate a disk 30 carrying a friction member such as a friction disk 31. The friction disk 31 bears against the actuating disk or pin wheel 32 which when rotated actuates the intermittent feed device of the moving picture camera or projecting machine. The disk 32 is normally held from rotation by a hook 33 on the lever 27 and engaging a pin 34 on the said disk 32.

When the circuit 23 is closed by the contact pieces 21 and 22, the magnet 25 being energized, the hook 33 is drawn away from in front of the pin 34, and the intermittent feed device of the camera or projecting machine is permitted to rotate under the control of the friction member 31. A spring actuated pawl 35 automatically interlocks with the lever 27 and holds the same retracted when drawn back by the magnet 25.

The operation of the devices which have been described is as follows: When the original performance of the act or scene is to be recorded upon the phonograph and photographed by the moving picture camera, a record blank is placed upon the tapering mandrel 14 of the phonograph and pushed thereon until it binds. The bracket 18 is then pushed against the end of the record blank and secured in place by means of the screw 17, the sharp edge 20 making a slight but readily visible mark in the end of the blank. A sensitized film is placed in the camera with a previously marked portion thereof opposite the light aperture. The stage is now illuminated and when the performers are ready to begin the performance the electric motor 10 is set into operation and the phonograph is driven thereby. As the phonograph is operated the contact piece 22 is moved transversely of the mandrel and record blank by means of the carriage 15 and comes into contact with the projection 21, and the circuit 23 being thus closed the camera is automatically set into operation by the mechanism already described, whereupon the act or performance which is to be photographed and recorded phonographically is commenced. Ordinarily an announcement of the act or scene to be recorded will be made on the phonograph before the circuit is closed and the moving picture camera is started. With some practice this announcement may be made to immediately precede the actual record, so that there will be no undesirable hiatus.

In order to reproduce the scenes and movements thus recorded and photographed, a positive film is made from the negative film by a direct printing process so that it is an exact duplicate thereof, and this positive film is placed in a projecting machine which is substituted for the moving picture camera, with the same point of the film opposite the projecting aperture as was opposite the exposure aperture when the camera was start-

ed to take the picture. A duplicate record made from the original master record is placed on a reproducing phonograph which is substituted for the recording phonograph in use during the original production of the act or scene, and the bracket 18 upon this phonograph is secured against the end of the record by means of the screw 17, the record having been turned to the same angular position upon the mandrel as was occupied by the master record. The original record may be used for reproduction upon the phonograph, in which case a phonograph with a feed screw having precisely the same pitch as that on the original recording phonograph will be used. If, however, a duplicate record made by the usual molding process is used for reproduction, (since the material from which such duplicate molded records are made, shrinks somewhat during the process of cooling, and the record is therefore somewhat shorter than the original master record,) a phonograph is used having a feed screw of somewhat smaller pitch than that of the phonograph used for recording. Such records shrink symmetrically throughout their length and the amount of such shrinkage is definitely known and may be accurately compensated by a change in the pitch of the feed screw as above indicated. The machines having been thus arranged, the phonograph is set into operation by starting the motor 10 and when the contact pieces 21 and 22 strike against one another the moving picture projecting machine will be set into operation when the reproducing stylus of the phonograph has reached a point on the record corresponding precisely with the point on the positive film at which the latter is set into motion, the announcement of the act or scene having first been reproduced phonographically, as will be understood. The two machines having been set into operation in the desired relation and being driven by driving mechanism identical with that used during the performance of the original act or scene, this desired identical relation will continue throughout the reproduction of the act or scene. Portions of the film corresponding to the successive phonograph records may be joined together by blank pieces of film, and as soon as the display of one such section has been completed, the lever 27 may be released from the pawl 35, when the moving picture machine will come to a stop. The record cylinder upon the phonograph may now be replaced by the record cylinder corresponding to the succeeding portion of film and the new section of film properly positioned upon the projecting machine, the bracket 18 properly adjusted and, as soon as the contact piece 22 strikes the contact piece 21 the projecting machine will again be set into operation,

and the performance can thus be continued until the entire length of film in the magazines of the moving picture projecting machine and the corresponding records have been exhausted.

Having thus described my invention, I claim:

1. In a device of the class described, the combination with a phonograph mandrel and carriage, and means for operating them, of a contact device carried by said mandrel, and adapted to engage the end of a record or blank placed upon said mandrel, a contact device carried by said carriage and adapted to contact said first named contact device at a fixed point in the travel of said carriage over said record or blank, a moving picture machine, and means for setting the same in operation automatically upon the contacting of said contact devices, substantially as set forth.

2. In a device of the character described, the combination of a phonograph comprising a rotatable support adapted to carry a sound record or blank, a contact piece carried by said support, a movable contact piece secured to a permanent part of the phonograph and adapted to be struck by the first named contact piece in its rotation by the support, an electric circuit normally open and adapted to be closed by the said contact pieces, an electromagnet, the coils of which are included within the electric circuit, a moving picture machine, common actuating means for the said phonograph and moving picture machine positively geared to the phonograph, means under the control of said magnet for preventing the operation of the moving picture machine, the movable contact being actuated by the phonograph to automatically effect the closing of said circuit to thereby energize said magnet for releasing the said preventing means, and means for automatically locking the said preventing means in releasing position upon the release thereof, substantially as described.

3. In a device of the class described, the combination with a phonograph mandrel and carriage and means for operating them, of an adjustable contact device carried by said mandrel and adapted to be adjusted with respect to the mandrel into a predetermined position relative to a record or blank placed upon the said mandrel, a contact device carried by the said carriage adapted to contact said first named device at a fixed point in the travel of said carriage over said record or blank, a moving picture machine and means for setting the same in operation automatically upon the contacting of said contact devices, substantially as set forth.

4. In a device of the class described, the combination with a phonograph mandrel and carriage and means for operating them,

of an adjustable contact device carried by said mandrel and adapted to be adjusted with respect to the mandrel into position against the end of a record or blank placed upon the said mandrel, a contact device carried by the said carriage adapted to contact said first named device at a fixed point in the travel of said carriage over said record or blank, a moving picture machine and means for setting the same in operation automatically upon the contacting of said contact devices, substantially as set forth.

5. In a device of the class described, the combination of a phonograph comprising a rotating mandrel adapted to carry a sound record or blank and a traveling carriage, a contact piece secured to said mandrel and a coacting contact piece upon said carriage, an electromagnet, a normally open electric circuit including the said contact pieces and the coils of the electromagnet, a moving picture machine located at substantially its focal distance from said phonograph, actuating means comprising a long substantially non-torsional shaft extending from the phonograph to the moving picture machine, and means under control of the said magnet for operatively connecting said projecting machine to the said actuating means, substantially as described.

6. The combination of a stage, a moving picture camera focused upon said stage, a recording phonograph adjacent said stage, a funnel connected with said phonograph and having a downwardly directed exit portion placed above the stage, said phonograph and funnel being located without the field of the camera, and means connecting said phonograph and camera for actuating the same in synchronism, substantially as set forth.

7. In a device for simultaneously reproducing sounds and exhibiting motion pictures the combination of a reproducing phonograph, a moving picture projecting machine, actuating means for the said pho-

nograph and projecting machine, means for preventing the operation of the projecting machine, a device secured to the record carrier of the phonograph, and means under the control of said device for releasing the said preventing means at a predetermined point in the operation of the phonograph, substantially as described.

8. In a device of the character described, the combination of means adapted to render a moving picture machine inoperative, and means for actuating said first means to render said moving picture machine operative comprising an electric circuit, an electro-magnet in said circuit, and a talking machine having a record carrier, and a device upon said carrier for closing said electric circuit, substantially as described.

9. In a device of the character described, the combination of a clutch adapted to lock a cinematograph mechanism against operation, and means controlling the operation of said clutch to release said cinematograph mechanism comprising an electric circuit, an electro-magnet in said circuit, and a talking machine having a record carrier and a device upon said carrier for closing said electric circuit.

10. In a device of the character described, the combination of a clutch adapted to lock a cinematograph mechanism against operation, and means controlling the operation of said clutch to release said cinematograph mechanism comprising an electric circuit, an electro-magnet in said circuit, and a talking machine having a record carrier, means upon said carrier for indicating the position for a sound record thereon, and a device upon said carrier for closing said electric circuit.

This specification signed and witnessed this 4th day of Feb., 1908.

THOMAS A. EDISON.

Witnesses:

FRANK D. LEWIS,

H. H. DYKE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."

1. The first part of the paper is devoted to a general discussion of the problem of the existence of solutions of the system of equations

$$\frac{dx}{dt} = f(x, y, z), \quad \frac{dy}{dt} = g(x, y, z), \quad \frac{dz}{dt} = h(x, y, z),$$

where f, g, h are continuous functions of x, y, z and satisfy the Lipschitz condition.

It is shown that if the functions f, g, h are bounded and the initial conditions are given, then the solution exists for all time.

2. In the second part of the paper, the problem of the uniqueness of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is unique.

3. In the third part of the paper, the problem of the stability of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is stable.

4. In the fourth part of the paper, the problem of the asymptotic stability of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is asymptotically stable.

5. In the fifth part of the paper, the problem of the periodicity of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is periodic.

6. In the sixth part of the paper, the problem of the boundedness of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is bounded.

7. In the seventh part of the paper, the problem of the convergence of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution converges.

8. In the eighth part of the paper, the problem of the divergence of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution diverges.

9. In the ninth part of the paper, the problem of the oscillation of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution oscillates.

10. In the tenth part of the paper, the problem of the non-oscillation of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is non-oscillatory.

11. In the eleventh part of the paper, the problem of the monotonicity of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is monotonic.

12. In the twelfth part of the paper, the problem of the non-monotonicity of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is non-monotonic.

13. In the thirteenth part of the paper, the problem of the boundedness of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is bounded.

14. In the fourteenth part of the paper, the problem of the unboundedness of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is unbounded.

15. In the fifteenth part of the paper, the problem of the convergence of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution converges.

16. In the sixteenth part of the paper, the problem of the divergence of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution diverges.

17. In the seventeenth part of the paper, the problem of the oscillation of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution oscillates.

18. In the eighteenth part of the paper, the problem of the non-oscillation of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is non-oscillatory.

19. In the nineteenth part of the paper, the problem of the monotonicity of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is monotonic.

20. In the twentieth part of the paper, the problem of the non-monotonicity of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is non-monotonic.

21. In the twenty-first part of the paper, the problem of the boundedness of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is bounded.

22. In the twenty-second part of the paper, the problem of the unboundedness of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution is unbounded.

23. In the twenty-third part of the paper, the problem of the convergence of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution converges.

24. In the twenty-fourth part of the paper, the problem of the divergence of the solution is considered.

It is shown that if the functions f, g, h satisfy the Lipschitz condition, then the solution diverges.

NEEDLE HOLDER FOR A TALKING
MACHINE,

1,182,922-----A. J. Mickley,
Patented-May 16th, 1916.
Filed-July 28th, 1915.

A. J. MICKLEY.
 NEEDLE HOLDER FOR A TALKING MACHINE.
 APPLICATION FILED JULY 28, 1915.

1,182,922.

Patented May 16, 1916.

Fig. 1.

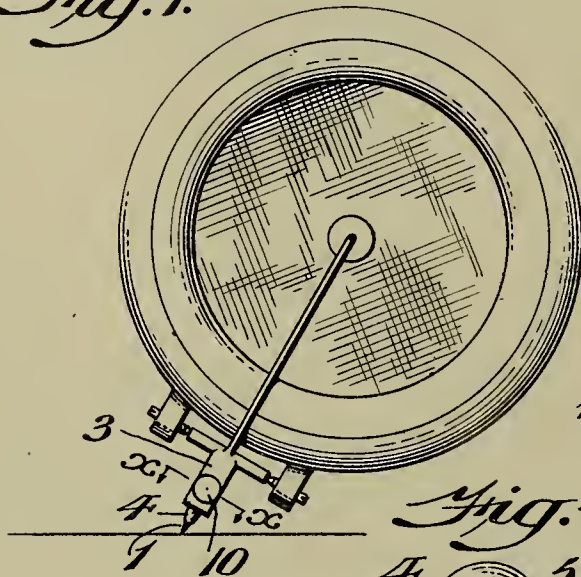


Fig. 2.

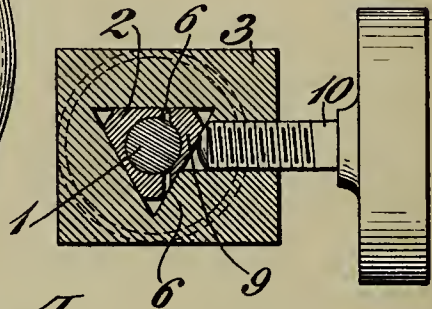


Fig. 4.



Fig. 3.

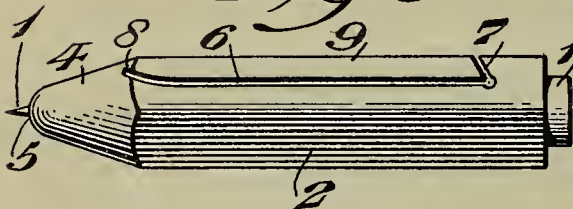


Fig. 5.

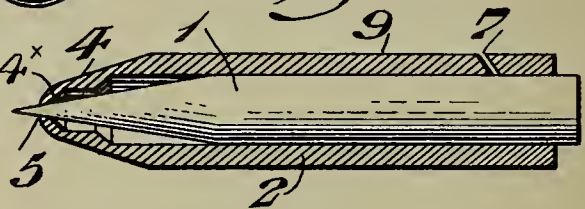


Fig. 6.

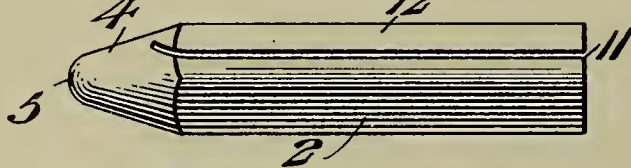


Fig. 7.

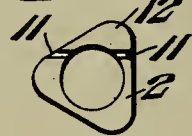


Fig. 8.

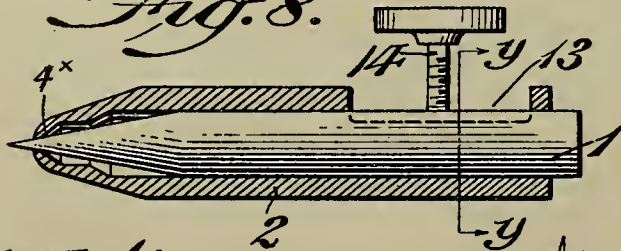


Fig. 9.



WITNESSES

H. E. Dieterich
L. Houville.

INVENTOR

BY

Albert J. Mickley
Piedersheim & Fairbanks
 ATTORNEYS

UNITED STATES PATENT OFFICE.

ALBERT J. MICKLEY, OF NEW YORK, N. Y.

NEEDLE-HOLDER FOR A TALKING-MACHINE.

1,182,922.

Specification of Letters Patent.

Patented May 16, 1916.

Application filed July 28, 1915. Serial No. 42,255.

To all whom it may concern:

Be it known that I, ALBERT J. MICKLEY, a citizen of the United States, residing in the city, county, and State of New York, have
5 invented a new and useful Needle-Holder for a Talking-Machine, of which the following is a specification.

My invention consists of an improvement in the means for firmly, immovably and uni-
13 formly holding the needle of a talking machine, the same embodying a sleeve or socket in which such needle is contained, the same being adapted to support directly the point
15 thereof, so that the needle is solidly and steadily sustained throughout its length, whereby the rasping, metallic, and other unsatisfactory sounds in the reproduction are obviated, and there are fuller, more distinct,
20 clearer and more resonant tones produced with much less wear upon the records than heretofore, due to the greater length and finer pointed needles that can be used with my invention.

25 The invention is satisfactorily illustrated in the accompanying drawing, but the important instrumentalities thereof may be varied, as long as they are included in the scope of the claims.

30 Figure 1 represents a side elevation of a needle holder for a talking machine embodying my invention. Fig. 2 represents a transverse section thereof on the line $x-x$ Fig. 1, on an enlarged scale. Fig. 3 represents a
35 side elevation thereof on an enlarged scale. Fig. 4 represents a front end view thereof. Fig. 5 represents a longitudinal section thereof. Fig. 6 represents a side elevation showing a slight modification thereof. Fig.
40 7 represents an end view thereof. Fig. 8 represents a longitudinal section of another embodiment of the invention. Fig. 9 represents a transverse section thereof on the line $y-y$ Fig. 8.

45 Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates the needle or stylus of a talking machine, and 2 designates a socket in which said
50 needle is contained, said socket preferably formed of tool-steel being fitted in the needle holding chuck 3, the latter excepting the feature of my invention applied thereto being heretofore in use. The inner wall of the
55 bore of said chuck is of angular form, and the exterior face of said socket 2 is similarly

shaped so that when said socket is fitted in said chuck, it is prevented from turning or shifting therein in rotary direction. The socket 2 is of the form of an elongated sleeve, 60 its forward or lower end being conical forming the nose 4 which has an opening therein, the wall of said opening being inturned forming the flange 4* which when the needle is inserted in the socket, its tapering point-
65 portion, a short distance back of its apex or point proper, is embraced tightly by said flange which holds said portion close to said apex, avoiding the protrusion of said apex to a great extent from said nose, while the
70 main portion of the body of the needle is contained in the socket and held therein tightly, and thus the needle is solidly and steadily sustained in the socket, and its protruding point-portion short in extent is
75 properly positioned for engagement with a record, as most plainly shown in Fig. 1.

The wall of the socket is cut or kerfed through in opposite portions thereof in longitudinal direction as at 6, and also cut or
80 kerfed through in diametrical direction as at 7, near the inner end of the socket, the cut 7 joining the ends of the cuts 6, thus separating three sides of a portion of the wall of the socket, leaving the portion 8 of said wall
85 at the terminal of the cuts 6 solid, producing the resilient tongue 9 whose back is adapted to be engaged by the point of the set screw 10, which is fitted in the side of the chuck so that when the said screw is properly rotated
90 it will cause the tongue 9 to flex toward the side of the needle and so engage the contiguous portion of the needle as to press the latter firmly against the opposite wall of the bore of the socket with resilient effect,
95 whereby the body of the needle will be firmly held in the socket while being furthermore held at its point portion in the wall of the opening 5 in the nose 4. In this manner the needle is most firmly and steadily retained
100 in position without liability to vibrate or wobble, producing results in the talking machine as hereinbefore stated.

In Figs. 6 and 7 I show kerfs 11 cut in the socket from the extreme inner end thereof
105 to the nose 4, forming the resilient tongue 12 in said socket, the operation of which is similar to the tongue 9 in the prior figures.

In Figs. 8 and 9 I show a socket without a tongue but exteriorly angular adapting
110 it to be fitted in a chuck, the wall of the bore of which will be similarly angular the re-

sult of which is the same as shown in Fig. 2, the wall of the socket being cut away in longitudinal direction forming the slot 13 to receive the shank of the screw 14, so that the point of said screw will engage directly the side of the needle 1, and so clamp the same, instead of by the interposed tongue, as in the other figures.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is:—

1. A holder for a needle of a talking machine comprising a socket member which is adapted to receive the body of said needle, said member having a perforated nose and an inturned flange on the wall of said nose, said flange being adapted to embrace tightly the tapering point-portion of the needle comparatively close to the point proper.

2. A holder for a needle of a talking machine comprising a socket having an inturned perforated nose, the inner wall of which tightly embraces the tapering portion of said needle close to the point proper thereof, and a clamping member on said socket adapted to engage tightly the body of the needle.

3. A holder for a needle of a talking machine comprising a needle receiving tubular member having thereon a resilient tongue, the latter being integral with the wall of said member and adapted to engage the body of the needle and clamp it therein.

4. A holder for a needle of a talking machine comprising a chuck member, a needle receiving tubular member therein having a movable tongue, the latter being adapted to bear against the body of the needle, and a tightening member on said chuck adapted to engage said tongue to press it against said body of the needle.

5. A holder for a needle of a talking machine comprising a needle receiving tubular member, a tongue comprising a portion of said member adapted to engage resiliently the side of the needle, a chuck member on a proper portion of the machine adapted to receive said tubular member, and a device on said chuck member adapted to engage the tongue to force it against the needle.

6. A holder for a needle of a talking machine comprising an inner socket member in whose bore a needle is adapted to be received, a resilient tongue in the wall of said socket member adapted to be clamped on the body of the needle, and a tubular chuck member adapted to receive said socket member, the bore of said chuck member, and the exterior face of said socket member, and said resilient tongue thereon being respectively of angular form.

ALBERT J. MICKLEY.

Witnesses:

EDGAR HUBEROGH,
J. S. Cox.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PROCESS OF MAKING SOUND RECORDS,
#1,183,358-----G. E. Emerson, Dec'd.,
Patented-May 16th, 1916.
Filed-June 5th, 1913.

G. E. EMERSON, DEC'D.
C. D. EMERSON, ADMINISTRATOR.
PROCESS OF MAKING SOUND RECORDS.
APPLICATION FILED JUNE 5, 1913.

1,183,358.

Patented May 16, 1916.

Fig 1

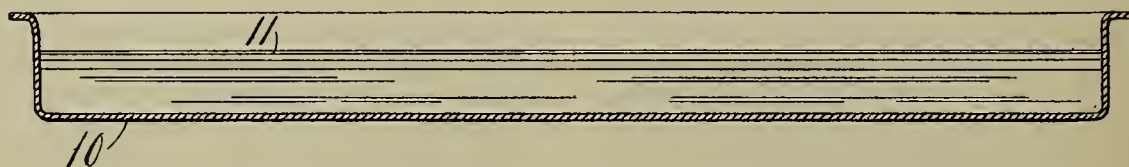


Fig 2

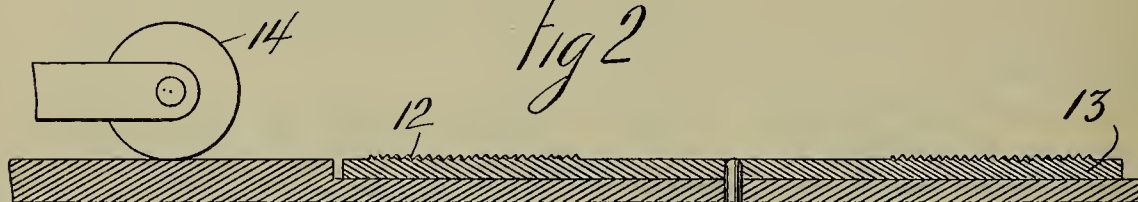


Fig 3

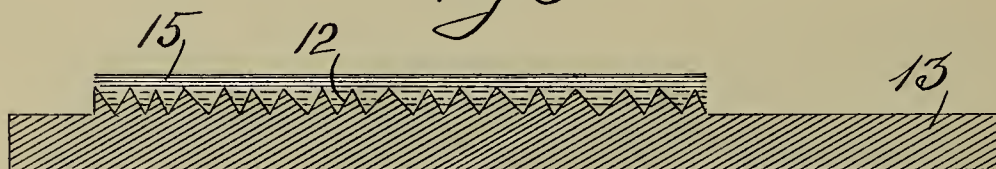
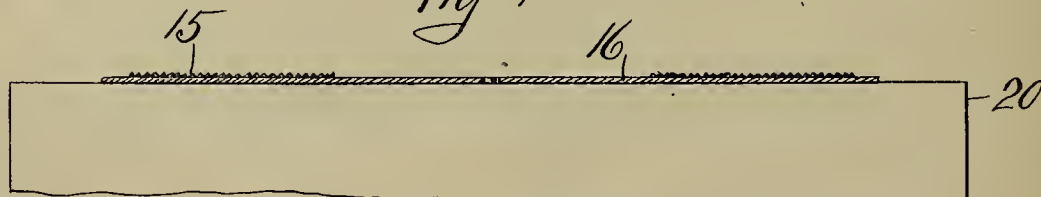


Fig 4



Witnesses:
Robert E. Lamuel
Harriet Hillman

George E. Emerson Inventor
By *his Attorney A. A. Dornville*

UNITED STATES PATENT OFFICE.

GEORGE E. EMERSON, OF NEWARK, NEW JERSEY; CLYDE D. EMERSON, ADMINISTRATOR OF SAID GEORGE E. EMERSON, DECEASED, ASSIGNOR, BY MESNE ASSIGNMENTS, TO EMERSON PHONOGRAPH COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PROCESS OF MAKING SOUND-RECORDS.

1,183,358.

Specification of Letters Patent.

Patented May 16, 1916.

Application filed June 5, 1913. Serial No. 771,793.

To all whom it may concern:

Be it known that I, GEORGE E. EMERSON, a citizen of the United States, and resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Processes of Making Sound-Records, of which the following is a specification.

This invention relates to sound records and the process for making the same.

Heretofore sound records, commonly designated as disk records, were made by pressing a heated matrix having record lines or undulations, with a heated thermoplastic material, by means of a hydraulic press. Both the matrix and material with this old process must be in a heated condition when pressed together, and after the record lines or undulations are impressed in the plastic material, the matrix is cooled to separate it from said material. This old process is slow in comparison with the steps of my new process and not as efficient.

The present invention consists essentially in treating a record material to obtain a solution and mixture, which is spread over a matrix. The fluid portion of the solution and mixture is then evaporated, to deposit the record material on the record surface of the matrix. A base is then taken and printed upon by the coated record surface, to transpose the surface of record material upon the base. The steps of the process are practically similar to the steps in the printing art, producing a sound record which is cheap in first cost, on account of the small amount of record material required and the time saved in its production. The new sound record is strong, durable and an efficient sound reproducer.

The invention is pictorially represented in the accompanying drawing, in which—

Figure 1 represents a pan with a solution and mixture of record material. Fig. 2 represents a sectional view of a matrix preferably of copper with a raised record surface located upon a support, and a spreading or inking roller. Fig. 3 shows an enlarged fragmentary section of the matrix after having been coated with the solution and mixture and Fig. 4 represents a section of a finished sound record lying upon a support.

To exemplify the new process and the

sound records produced thereby, a shellac like record material is treated with alcohol in a pan 10 to obtain a solution and mixture 11. The solution and mixture is spread on the raised record line 12 of a preferably copper matrix 13 by means of a roller 14. The matrix may be warmed while being coated with the solution and mixture, the operation being similar to the inking of type. The matrix is then warmed to a slightly higher degree to evaporate the fluid of the solution and mixture, thereby leaving the thermoplastic record material 15 in the record surface 12 of the matrix, depositing a coating which I term a dry ink. The warming of the matrix is then continued until the record material becomes soft. The matrix with the record material is then pressed against a base 16 of suitable material, which latter may be metal, paper, celluloid, wood, cloth, leather, etc. The paper may or may not be covered with a sizing, such as shellac or rosin. The record material will adhere to the base, and if paper is used will adhere to the fibers of the latter. Next the matrix is cooled when the record material will separate therefrom and be found secured to the base or paper. The deposited record material on the paper is an exact and true transposition of the sound record surface of the matrix.

The paper or other base upon which the record material is deposited is preferably maintained cold by lying upon a cold support 20, that will chill the record material upon the matrix, as it is transmitted therefrom to the paper, and permits the relatively instantaneous deposit of the record material upon the base or paper.

Having described my invention what I desire to secure by Letters Patent and claim is:

1. The process of making a sound record consisting in treating a record material to produce a solution and mixture, coating a sound record matrix surface with the solution and mixture, evaporating the solvent of the solution and mixture to deposit the residue thereof on the sound record surface and transposing the residue to a base.

2. The process of making a sound record consisting in treating a record material to produce a solution and mixture, coating a

sound record surface of a matrix with the solution and mixture, evaporating the solvent on the sound record surface and thereby leaving the record material on the said
5 record surface of the matrix, softening the material on the record surface and then transposing the said material to a base.

3. The process of making a sound record consisting in treating a record material to
10 produce a solution and mixture, coating the sound record surface of a matrix with the solution and mixture, evaporating the solvent on the sound record surface, softening the material located upon the sound record
15 surface and then pressing the matrix with its deposited record material with a base to transpose the surface of record material upon said base.

4. The process of making a sound record
20 consisting in treating a record material with a fluid to form a solution and mixture, coating the sound record surface of a matrix with the solution and mixture slightly warming the matrix to evaporate the fluid
25 of the solution and mixture, and thereby leaving the residue of the solution and mixture on the sound record surface of the matrix, slightly further warming the matrix to evaporate the fluid of the record material on the record surface and then pressing
30 the deposited record material upon a base.

5. The process of making a sound record consisting in treating a record material to
35 produce a solution and mixture, coating the sound record surface of a matrix with the solution and mixture, evaporating the solution and mixture on the sound record surface to deposit the residue on the sound
40 record surface, softening the residue and transposing it to a base and hardening the product.

6. The process of making a sound record consisting in treating a record material with
45 a fluid to produce a solution and mixture, coating the sound record surface of a matrix with the solution and mixture, evaporating the solution and mixture on the sound record surface to deposit the residue
50 thereon, softening the residue by slightly

warming the same, and then printing the record surface of record material on a base.

7. The process of making a sound record consisting in treating a shellac like material
55 to form a solution and mixture, coating the sound record surface of a matrix with the solution and mixture, evaporating the solution and mixture on the sound record surface to deposit the residue thereon, slightly
60 warming the residue to soften the same and then transposing it upon a base, thereby forming with the residue an exact transposition of the sound record surface of the matrix upon the base.

8. The process of making a sound record
65 consisting in treating a shellac like material with a fluid to form a solution and mixture, coating a warmed matrix with the solution and mixture in a manner similar to spreading ink on type, evaporating the solvent
70 from the coating by slightly further warming the matrix to deposit the residue of the solution and mixture on the sound record surface of the matrix, slightly warming the
75 residue to soften the same, and printing the residue upon paper, thereby forming an exact transposition of the sound record surface of the matrix upon the paper.

9. The process of making a sound record consisting in treating a shellac like material
80 with alcohol to form a solution and mixture, coating a warmed matrix having a raised record surface with the solution and mixture in a manner similar to spreading ink on type, evaporating the solvent from
85 the coating by slightly further warming the matrix to deposit the residue of the solution and mixture on the sound record surface of the matrix, slightly warming the residue to soften the same, printing the record material upon a base located upon a cold support to separate the record material from
90 the matrix and deposit it upon the base.

Signed at the borough of Manhattan, in the county of New York and State of New
95 York this 26th day of May A. D. 1913.

GEORGE E. EMERSON.

Witnesses:

PHILIP MARKSOHN,
HARRY L. MARKER.

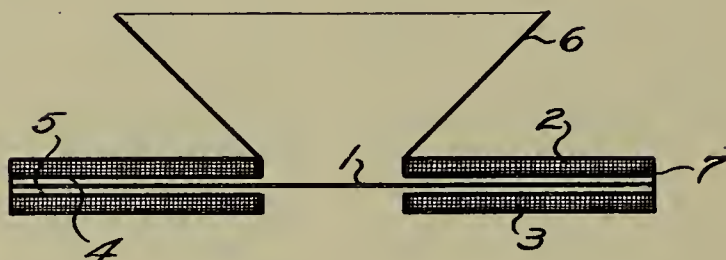
METHOD AND APPARATUS FOR RE-
PRODUCING SOUNDS,

1,183,404-----R. Rummler,
Patented-May 16th, 1916.
Filed-April 16th, 1912.

R. RUMMLER.
METHOD AND APPARATUS FOR REPRODUCING SOUNDS.
APPLICATION FILED APR. 16, 1912.

1,183,404.

Patented May 16, 1916.



Witnesses:

Edwin Theep.
M. Irene Hutchings.

Inventor,
Rudow Rummler,
Attorneys.

UNITED STATES PATENT OFFICE.

RUDOW RUMMLER, OF DAYTON, OHIO.

METHOD AND APPARATUS FOR REPRODUCING SOUNDS.

1,183,404.

Specification of Letters Patent.

Patented May 16, 1916.

Application filed April 16, 1912. Serial No. 691,145.

To all whom it may concern:

Be it known that I, RUDOW RUMMLER, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Methods and Apparatus for Reproducing Sounds, of which I declare the following to be a full, clear, and exact description.

This invention relates to a method and an apparatus for the reproduction of vocal sounds.

The prime objects of the invention are to decrease residual effects in telephone receivers, and to provide a method of operation and a structure permitting the selection of diaphragms from a wide range of materials having different enunciative properties. To accomplish these objects, means are provided for vibrating dielectric diaphragms by inducing molecular stresses therein, these molecular stresses resulting in a bodily vibration of the diaphragm.

The accompanying illustration is diagrammatic and shows a diaphragm 1 which may be of any material, but for the purposes of this description it is assumed to be a thin sheet of glass although other dielectrics of high inductive capacity may be employed. The diaphragm is located between a pair of coils 2 and 3 connected in series or parallel to telephone line wires, the object of the construction being to permit high inductive action to take place across the intervening diaphragm and in accordance to variations of the line current when transmitting vocal sounds. A mass of metal not in the line circuit will therefore serve the purpose of one of the coils; however, a single coil is effective. The two coils are in close inductive relation. Thus a powerful flux in proportion to the energy impressed on the coils passes through the diaphragm 1. The coils, to intensify the action, have their convolutions cemented together by dielectrics of high inductive capacity terminating in the plane surfaces 4 and 5 opposite the diaphragm. The insulating lacquers and varnishes of commerce, complying with the usual requirements of such substances, serve this purpose, those having relatively high inductive capacity being preferred.

By the above arrangement of coils and diaphragm, a changing dielectric stress in the latter, due to the passage through the coils of a current having speech character-

istics, causes it to vibrate accordingly and thus reproduce the desired sounds.

For the purpose of completing the illustration, a sound amplifying horn of usual function is indicated at 6 leading to the center of one of the air spaces or to both as by providing a central opening in the diaphragm. The horn is supported by the instrument's casing 7.

In operation a current varying according to speech characteristics, in passing around the coils causes a varying flux between the same to vary the disposition of the molecules of, and therefore the tension of the dielectric diaphragm causing it to vibrate in harmony with the current and thus reproduce speech.

The iron losses occurring in magnetically operated receivers are not necessarily a factor, while the multiplying effect of coils is taken full advantage of. As a consequence of the absence of iron losses, the instrument preserves the true proportion between vibrations of different amplitudes.

The principle of the apparatus is such that it may be varied in size and proportions to suit different requirements as to use and circuit conditions.

The arrangement of inductors 2 and 3 is such that powerful molecular stresses may be effected in the intervening air and augmented by a diaphragm or resonant board of any material.

It is believed that the invention possesses the required novelty as to its mode of operation and design as to entitle it to broad protection in the matter of equivalents.

What is claimed is:—

1. The art of reproducing vocal sounds by vibrating a dielectric through molecular stresses induced in the same.

2. In a telephone, a pair of coils of wire, and a vibratable dielectric between the coils and arranged therewith to be vibrated by molecular stresses induced in said dielectric and thus produce sounds.

3. A diaphragm of dielectric material and means for inducing molecular stresses therein for the purpose of vibrating the same.

4. In a telephone, a diaphragm of dielectric material and an inductor coil for inducing molecular stresses in the diaphragm.

5. In a telephone, a dielectric diaphragm, and a spiral inductor coil opposite each face of the diaphragm adapted to vibrate the

diaphragm by inducing molecular stresses therein.

6. In a telephone, a coil of wire, a conducting element inductively associated with
5 the coil, and a dielectric diaphragm mounted to vibrate between the same as a result of molecular stresses induced therein.

7. The method of producing sounds by

vibrating a dielectric diaphragm by inducing electrical stresses therein.

In testimony whereof I affix my signature in the presence of two witnesses.

RUDOW RUMMLER.

Witnesses:

J. BYRON RICKETTS,
CARL W. BEUST.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."

GRAPHOPHONE PATENT.

1,184,060

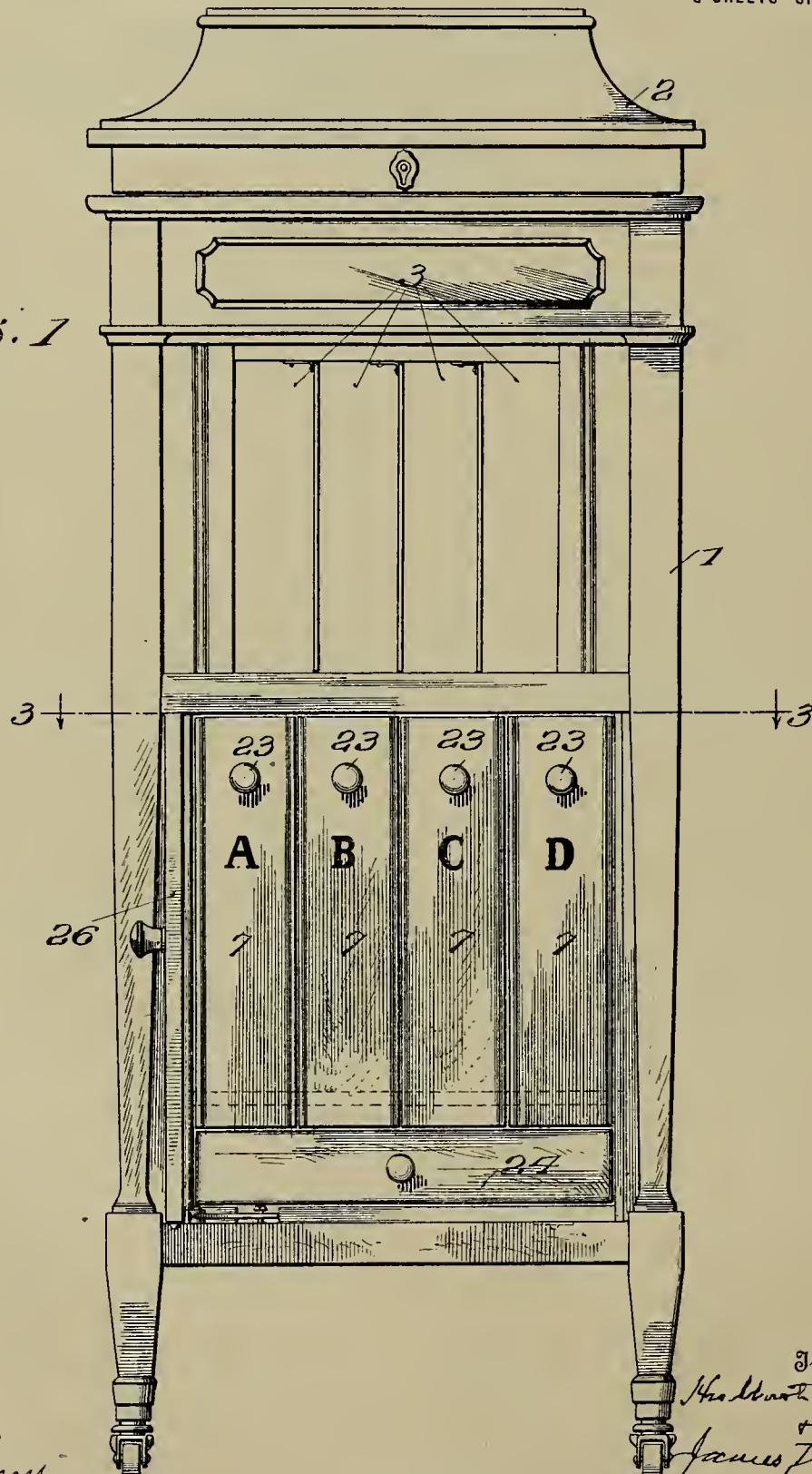
CABINET FOR SOUND RECORDS,
#1,184,060-----H.A.Yerkes & J.D.Adams,
Patented-May 23rd, 1916.
Filed-July 30th, 1913.

H. A. YERKES & J. D. ADAMS.
CABINET FOR SOUND RECORDS.
APPLICATION FILED JULY 30, 1913.

1,184,060.

Patented May 23, 1916.
3 SHEETS—SHEET 1.

Fig. 1



Witnesses
J. B. Wegmann
E. E. Warfield

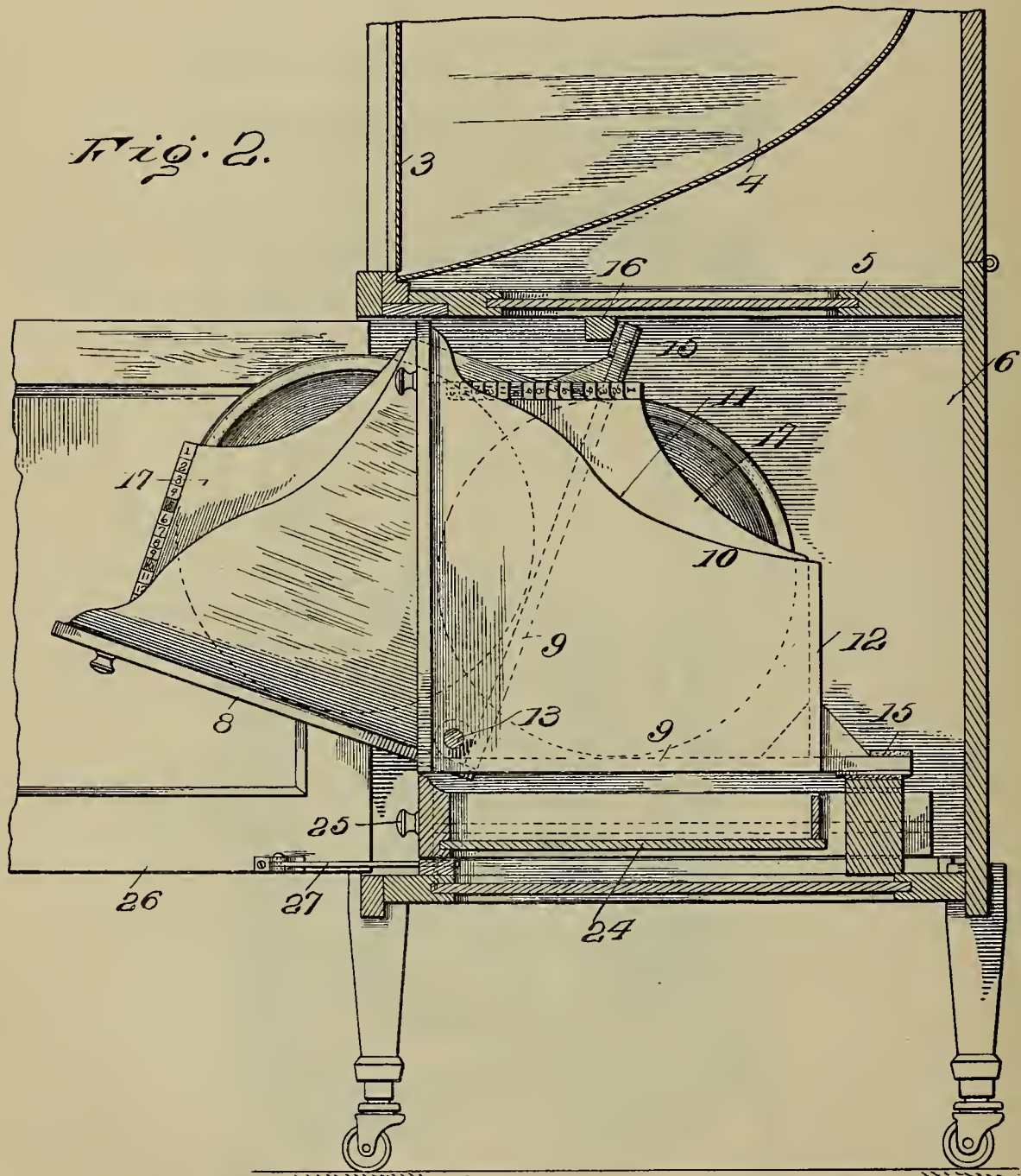
Inventors
H. A. Yerkes
&
James P. Adams
By Mauro Cameron Lewis & Massie
Their Attorneys



H. A. YERKES & J. D. ADAMS.
CABINET FOR SOUND RECORDS.
APPLICATION FILED JULY 30, 1913.

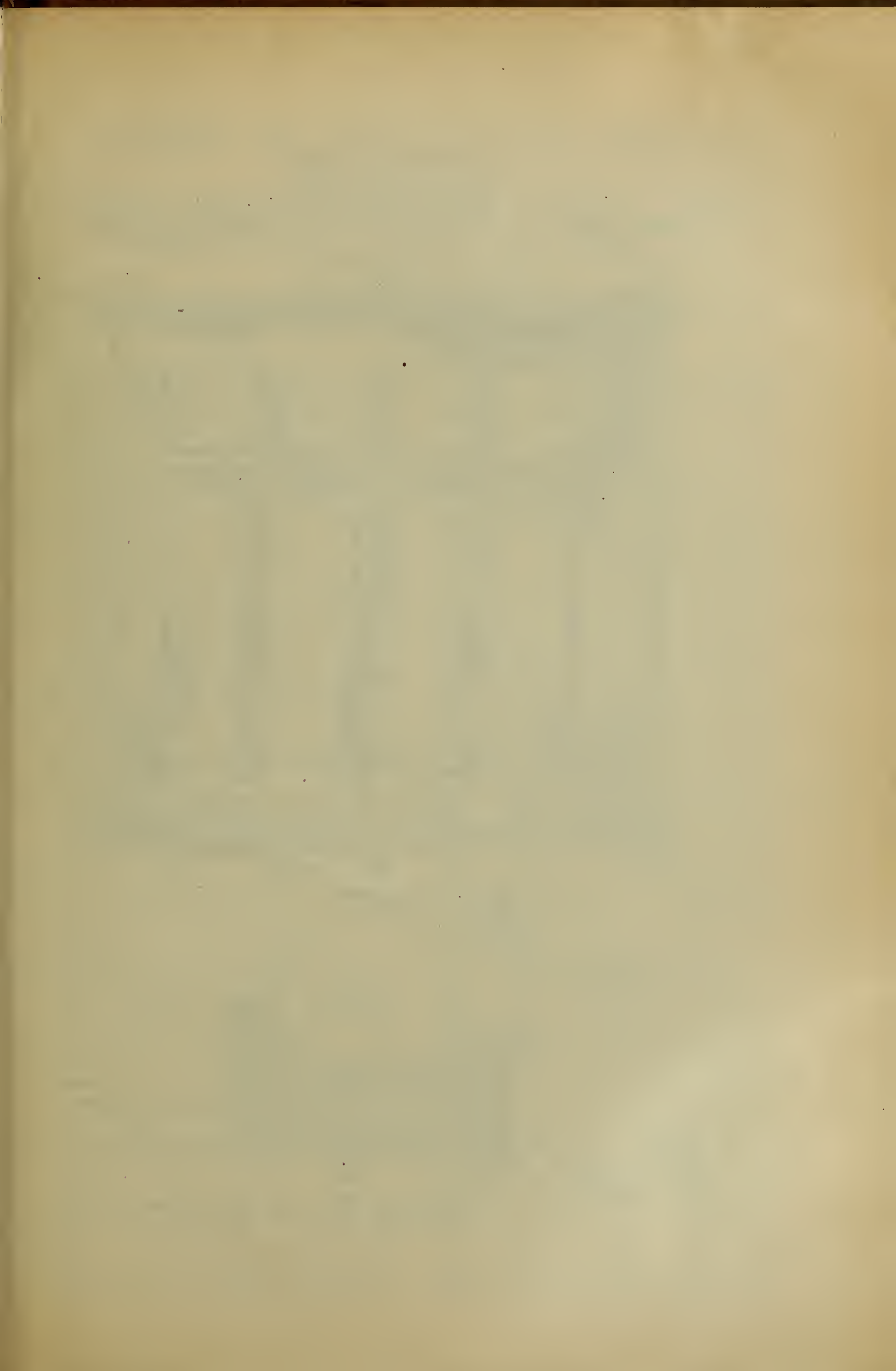
1,184,060.

Patented May 23, 1916.
3 SHEETS—SHEET 2.



Witnesses
L. B. Wegenast.
E. E. Warfield

Inventors
H. A. Yerkes &
James D. Adams
By
Mauro Cameron Lewis & Mapp, Attorneys



H. A. YERKES & J. D. ADAMS.
CABINET FOR SOUND RECORDS.
APPLICATION FILED JULY 30, 1913.

1,184,060.

Patented May 23, 1916.

3 SHEETS—SHEET 3.

Fig. 3.

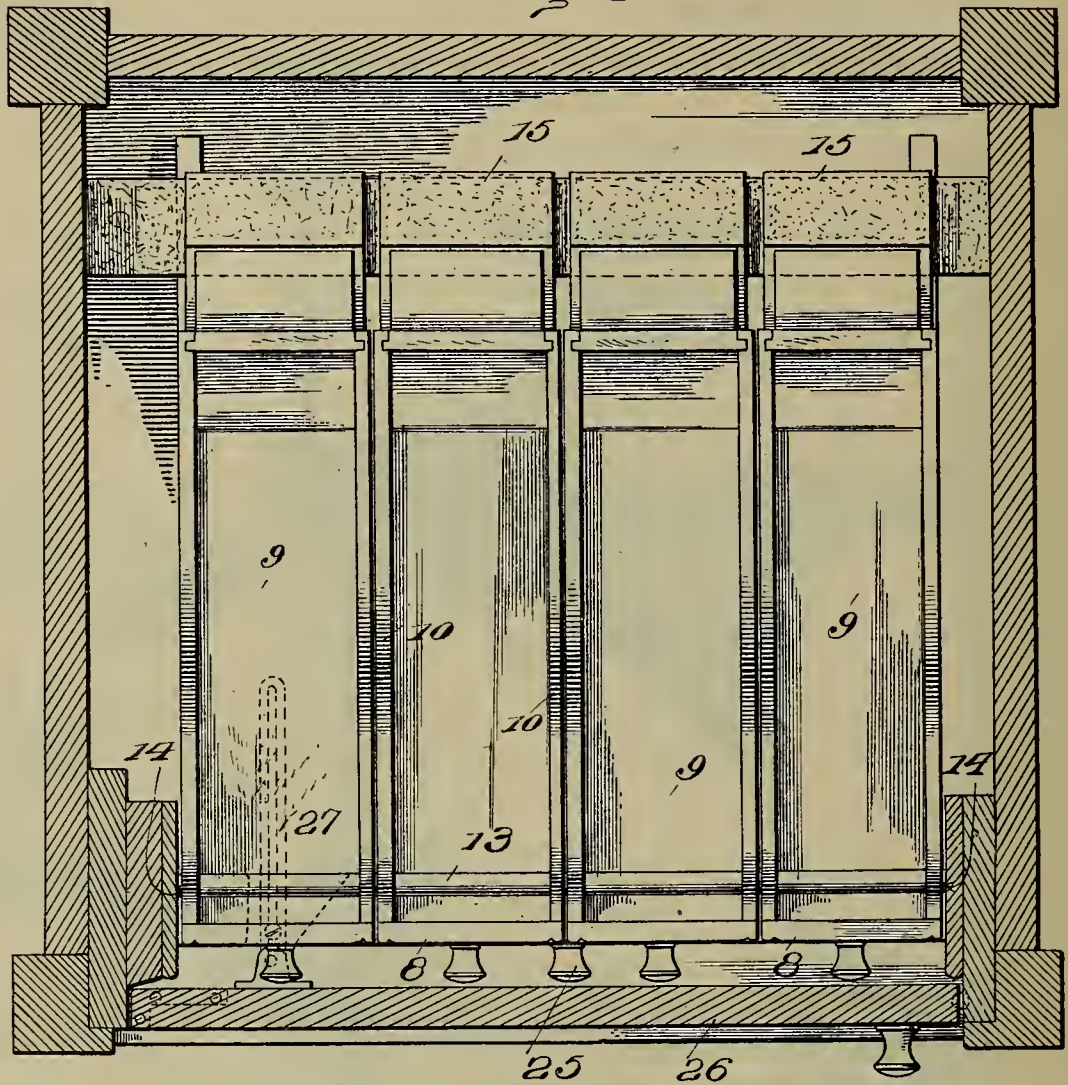
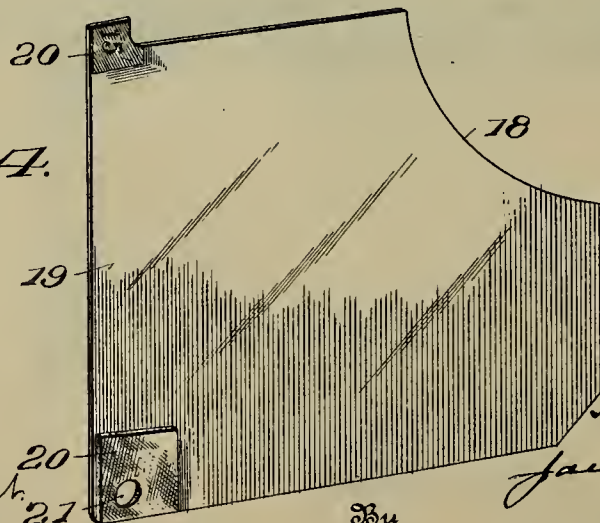


Fig. 4.



Witnesses

L. B. Wegenast
E. E. Warfield

Inventors

Hulburd Yerkes

James D. Adams,

By

Maura Cameron Lewis & Massie Attorneys

UNITED STATES PATENT OFFICE.

HULBERT A. YERKES, OF HACKENSACK, NEW JERSEY, AND JAMES D. ADAMS, OF WABASH, INDIANA, ASSIGNORS TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

CABINET FOR SOUND-RECORDS.

1,184,060.

Specification of Letters Patent.

Patented May 23, 1916.

Application filed July 30, 1913. Serial No. 782,053.

To all whom it may concern:

Be it known that we, HULBERT A. YERKES and JAMES D. ADAMS, citizens of the United States, and residents of Hackensack, New Jersey, and Wabash, Indiana, respectively, (whose post-office addresses are Hackensack, New Jersey, and Wabash, Indiana, respectively,) have invented a new and useful Improvement in Cabinets for Sound-Records, which invention is fully set forth in the following specification.

This invention relates to cabinets for disk sound records, and has for its object to provide a cabinet which shall be ornamental in appearance and in which a large number of records may be stored, without danger of injury to the record, and which shall be readily accessible and so constructed and arranged that any desired record can be instantly selected from among the large number stored in the cabinet. With this object in view, the invention consists in the construction and combination of elements hereinafter described and then defined in the claims.

The inventive idea involved is illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of a talking machine cabinet embodying the invention, Fig. 2 is a central vertical broken section through Fig. 1, Fig. 3 is a horizontal section through Fig. 1 taken on the line 3—3, and Fig. 4 is a perspective view of a detail.

Referring to the drawings, in which corresponding reference characters are applied to corresponding parts, 1 is a talking machine cabinet of any suitable construction provided with the usual cover or lid 2, secured thereto in the usual or any suitable way and provided with the slats 3 pivoted or otherwise mounted in front of the interior horn 4.

All of the parts thus far described may be of the usual or any desired construction, since the specific construction of these parts does not constitute any part of the present invention.

The upper portion of the cabinet, in which is located the horn 4, is preferably separated from the lower portion by a horizontal partition 5 forming a chamber 6, in which chamber is a plurality of record-receiving trays 7, four being shown in the

present instance. Said trays are formed with vertical front walls 8, horizontal bottom walls 9, and side walls 10, which side walls are preferably cut away at the upper rear corners thereof, as indicated at 11, Fig. 2, and are united to a rear wall 12 which extends in a vertical direction only for about half the height of the chamber 6. All of the trays 7 are pivoted on a horizontal pivot rod 13 which extends through the lower front corner of the trays, with its ends secured in the frame-work of the cabinet, as shown at 14, Fig. 3. The bottom wall 9 of each tray is provided with an extension 15 projecting, when the trays are in position within the cabinet, some distance to the rear of the rear wall 12 of the tray, and a suitable stop, here shown in the form of a horizontal transverse bar 16, Fig. 2, is placed in the top of the chamber 6 in such a position that when one of the trays 7 is tilted outwardly, as shown in Fig. 2, around the pivot 13, the extension 15 engages the stop 16 and limits the outward movement of the tray. The trays 7—7 are preferably in contact with each other, or substantially in contact, as indicated in Figs. 1 and 3; but it will be understood that so far as the invention is concerned actual physical engagement of one tray with the next is not essential and any such close juxtaposition of the trays as precludes the provision of bearings between them brings the structure within the scope of the invention.

Within each of the trays 7 is a plurality of index cards 17, Fig. 4, approximately rectangular in form except that the upper rearward corner of the card is cut away, preferably on curved lines, as shown at 18, Fig. 4. Each of these cards is provided with a reinforcing piece 19, preferably of strong fabric cemented to the card at the lower front corner thereof, and with an index 20 at its upper forward corner, said index preferably being in the form of a numeral upon a piece of fabric properly cemented to the card, and preferably also certain of these indices differ in color from the majority of the series, in order that the eye may quickly reach any desired number. Thus for example, as shown in Fig. 2, the indices 5 and 10 are of some distinguishing color as red, whereas the other indices may be simply black on a white or other suit-

able background. The index cards being thus prepared, are located within the trays 7 with the pivot rod 13 passing through suitable openings 21, Fig. 4, in the lower front reinforced corner of the card. Preferably also the indices 20 project up slightly above the upper edge 22 of the card.

Each of the trays 7 is preferably provided on its forward face with a suitable index character, such as the letters A, B, C, and D, respectively, as shown in Fig. 1, and preferably the trays are also provided with knobs 23 to facilitate tipping the trays outwardly upon the pivot 13.

Preferably there is placed in the cabinet, beneath the trays 7, a drawer 24 which is to be used for holding needles, oil can, record lists, etc., such drawer being provided with the usual knob 25. If desired, the cabinet may be provided with a door 26 which may be either in the form of a single door hinged at one side, as shown in the drawings, or manifestly two doors may be employed hinged at the two sides, and any suitable stop 27 may be used to limit the outward opening movement of the door.

In use the records are inserted in the trays between the index cards, the several records being separated by the cards and thereby preserved from injury by rubbing against each other. By means of a list of the records stored in the cabinet, on which list the lettering of the tray and the number of the record in the tray correspond to the position of the record, the latter may be instantly located, and by means of the distinguishing coloring of the indices, as 5 and 10, the rapid location of any desired number corresponding with the particular record is greatly facilitated.

It will be perceived that by the present invention means are provided for storing a large number of records in a very compact space, where they will be securely protected from injury, and from which any desired record may be obtained in minimum time and with little trouble.

Having thus described the invention, what is claimed is:—

1. In a cabinet for sound records, a series of vertically arranged trays substantially in lateral contact with each other, a series of division cards loosely arranged in each tray, and a single pivot passing through all of the trays and division cards and secured at its ends in the frame-work of the cabinet, each of the said trays being independently movable on the said pivot and each of the said

cards being held in its place in its tray by the said pivot.

2. In a cabinet for sound records, a series of vertical trays arranged side-by-side and cut away at their upper rearward portions, a series of record separating cards loosely arranged in each of said trays and each of said cards being cut away at its upper rearward portion to expose the records but leaving the upper parts of the cards exposed beyond the trays, and a single horizontal pivot passing through the lower forward portion of each of said trays and cards and having its ends secured in the frame-work of the cabinet.

3. In a cabinet for talking machine records, a series of vertical trays arranged side-by-side and each having its bottom or floor extending beyond the rear wall thereof, a single horizontal pivot extending through the lower front portion of the entire series of trays and having its ends secured in the frame-work of the cabinet, and a single horizontal bar in the cabinet and in the path of the rearward extensions of the bottom of the trays when said trays are swung outwardly on said pivot.

4. In a cabinet for sound-records, a normally vertical tray horizontally pivoted to the cabinet and movable outward therefrom about its pivot, a series of record separating cards in the tray cut away at the corners which are uppermost when the tray is moved outward to expose the records, and indices on the upper edges of the front portions of the cards.

5. In a cabinet for sound-records, a normally vertical tray horizontally pivoted to the cabinet and provided with side walls cut away at their upper rearward portions, a series of record separating cards in the tray cut away at the rear upper portions to expose the records but leaving the upper parts of the cards exposed beyond the tray, and indices on the upper edges of the front portions of the cards.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

HULBERT A. YERKES.
JAMES D. ADAMS.

Witnesses as to Yerkes:

C. O. L. MASSIE,

WILLARD H. HARTING.

Witnesses as to Adams:

WILLIAM L. BRADIN,

EYLAN M. ROSS.

GRAPHOPHONE PATENT.
1,184,221

VIOLIN,

1,184,221-----H. Watty.
Patented-May 23rd, 1916.
Filed-August 31st, 1912.

1,184,221.

Patented May 23, 1916.

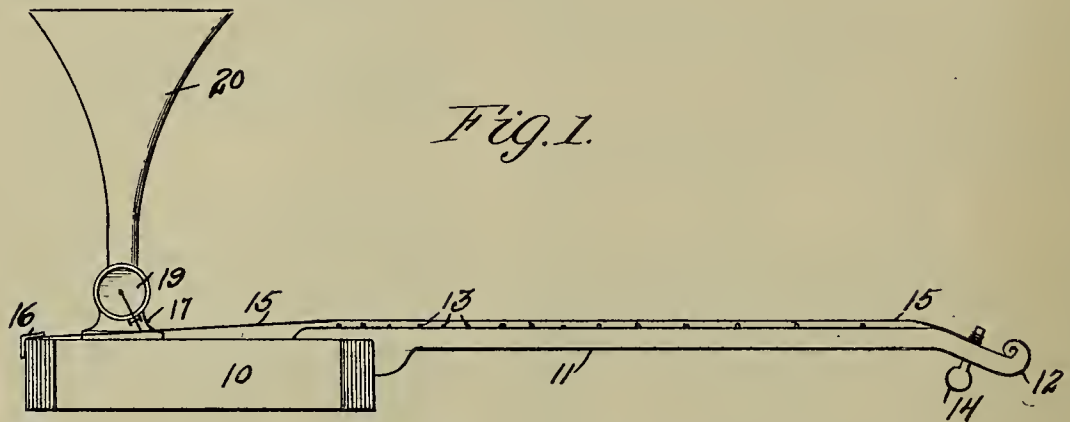


Fig. 1.

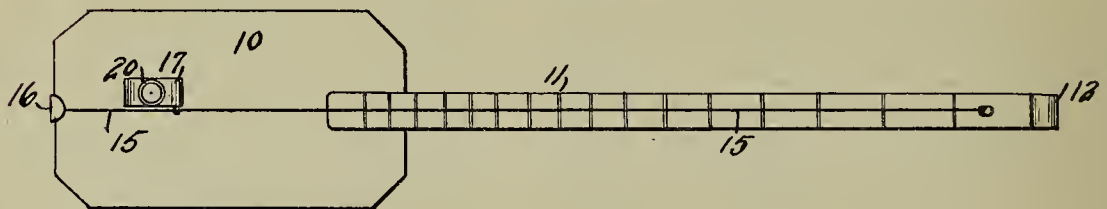


Fig. 2.

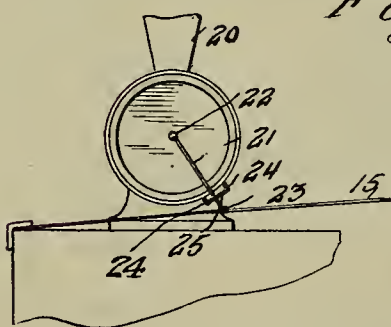


Fig. 3.

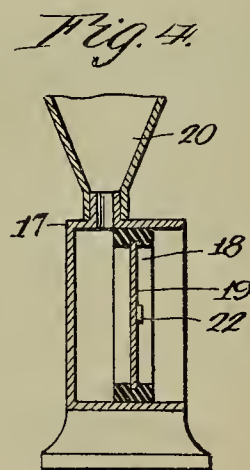


Fig. 4.

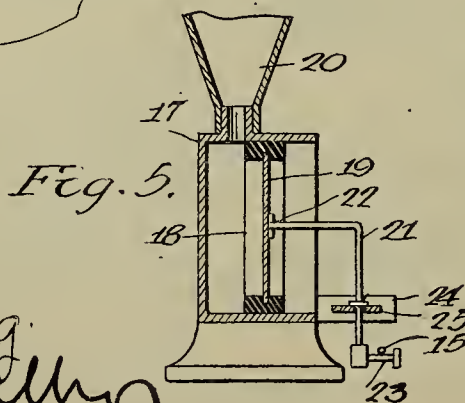


Fig. 5.

WITNESSES

G. M. Spring.
 J. R. Kelly

INVENTOR

Hedley Watty,
 by Richard Brown
 Attorney

UNITED STATES PATENT OFFICE.

HEDLEY WATTY, OF PATCHOGUE, NEW YORK.

VIOLIN.

1,184,221.

Specification of Letters Patent.

Patented May 23, 1916.

Application filed August 31, 1912. Serial No. 718,079.

To all whom it may concern:

Be it known that I, HEDLEY WATTY, a subject of the King of Great Britain, residing at Patchogue, in the county of Suffolk and State of New York, have invented new and useful Improvements in Violins, of which the following is a specification.

This invention relates to musical instruments and has to do more particularly with improvements in the means for amplifying the sound produced from string instruments, such means including a sound box or casing and a transmission member for transmitting vibrations to a diaphragm.

It is one of the objects of this invention to more accurately and sensitively transmit the vibrations from the string to the diaphragm and therefore it is one of the objects of the invention to provide a transmission member which may be secured to the string in such a manner as to take the place of the usual bridge.

With the above and other objects in view, my invention relates to such details of construction and in the arrangement and combination of parts as will be hereinafter fully described and specifically set forth in the appended claim.

In describing my invention in detail, reference will be had to the accompanying drawings wherein like characters denote like or corresponding parts throughout the several views, and in which:—

Figure 1 is a side elevation of my invention. Fig. 2 is a plan view thereof showing the horn removed. Fig. 3 is a fragmentary view, and Fig. 4 is a vertical sectional view showing the diaphragm and a portion of the horn in detail. Fig. 5 is a vertical sectional view illustrating the transmission bar which connects the diaphragm to the string.

In the accompanying drawings wherein is illustrated the preferred form of my invention, the numeral 10 designates the body of the violin which is preferably constructed from a wood similar to that provided in the construction of violins. While this form of body portion has been shown, it is to be realized that I do not limit myself to this,

and that other forms can be provided and used as well.

A neck 11, which is curved at its end as shown at 12, is provided with a plurality of transversely disposed frets 13, and is connected with the body. The neck has extending vertically therethrough a tuning pin 14 about which is fastened one end of a string 15, the latter having its other end secured to a tail piece 16 carried upon the body.

The above mentioned elements constitute broadly the violin portion of the device, and the elements hereinafter appearing have relation to the improvement constituting my invention.

A diaphragm sound box or casing having a base 17, is mounted upon the body portion 10 and carries therein a sleeve of rubber 18; the latter serves to support a diaphragm 19. Projecting upwardly from the base portion and directly above the upper portion of the diaphragm is a horn 20 which serves to amplify the sound. A transmission bar 21 has one of its ends secured to the diaphragm, as at 22, the other end thereof being in direct connection with the string, as at 23, to serve as a bridge and to transmit the vibrations of the string to the diaphragm. A pair of lugs 24 extend outwardly from the base and support a resilient plate 25, the said plate extending between said lugs and yieldingly supporting the transmission bar 21.

From the above, it is thought that the advantages and novel features of my invention will be readily comprehended.

I desire to be understood that I may make slight changes in the construction and in the arrangement and combination of parts without departing from the spirit of my invention, provided, however, such changes fall within scope of the subjoined claim.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

A violin including a body, a string mounted thereon, a sound box carried by said body and having an opening in its

H. WATTY.
VIOLIN.

APPLICATION FILED AUG. 31, 1912.

1,184,221.

Patented May 23, 1916.

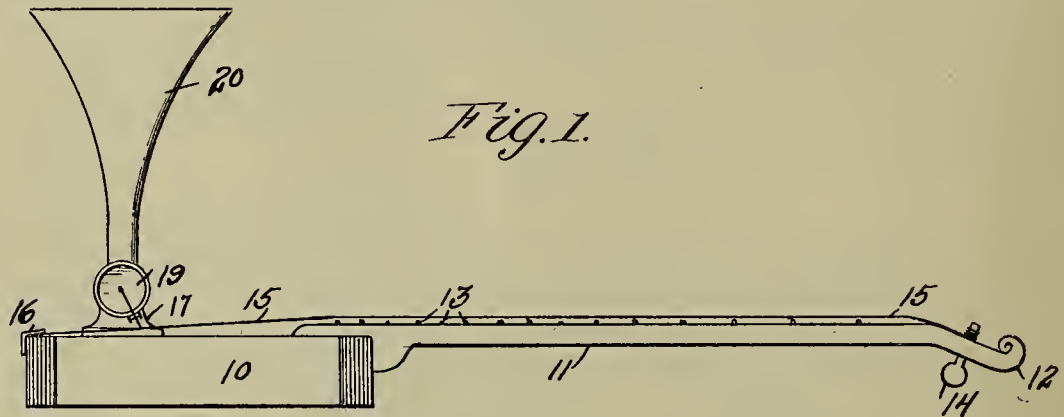


Fig. 1.

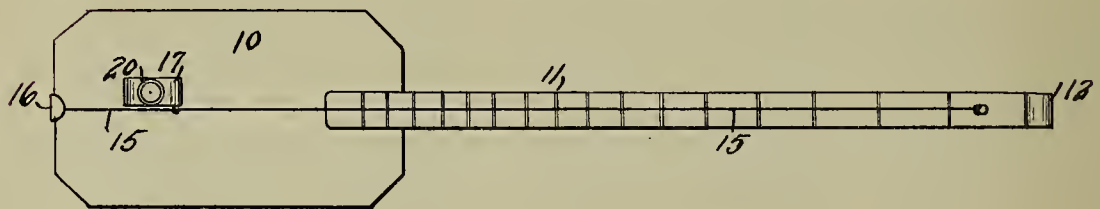


Fig. 2.

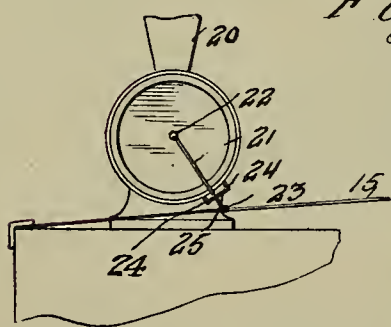


Fig. 3.

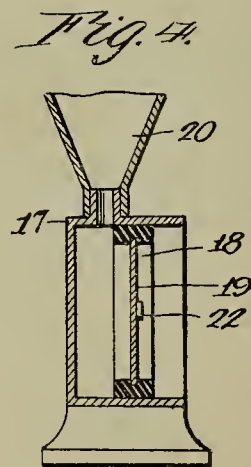


Fig. 4.

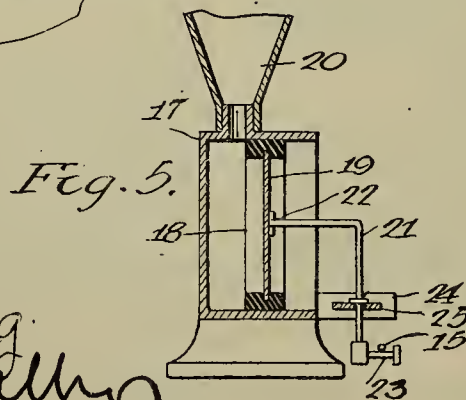


Fig. 5.

WITNESSES

E. M. Spring.
J. R. Kelly

INVENTOR

Hedley Watty,
Richard W. Watty
his Attorney

UNITED STATES PATENT OFFICE.

HEDLEY WATTY, OF PATCHOGUE, NEW YORK.

VIOLIN.

1,184,221.

Specification of Letters Patent.

Patented May 23, 1916.

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This invention relates to musical instruments and has to do more particularly with improvements in the means for amplifying the sound produced from string instruments, such means including a sound box or casing and a transmission member for transmitting vibrations to a diaphragm.

It is one of the objects of this invention to more accurately and sensitively transmit the vibrations from the string to the diaphragm and therefore it is one of the objects of the invention to provide a transmission member which may be secured to the string in such a manner as to take the place of the usual bridge.

With the above and other objects in view, my invention relates to such details of construction and in the arrangement and combination of parts as will be hereinafter fully described and specifically set forth in the appended claim.

In describing my invention in detail, reference will be had to the accompanying drawings wherein like characters denote like or corresponding parts throughout the several views, and in which:—

Figure 1 is a side elevation of my invention. Fig. 2 is a plan view thereof showing the horn removed. Fig. 3 is a fragmentary view, and Fig. 4 is a vertical sectional view showing the diaphragm and a portion of the horn in detail. Fig. 5 is a vertical sectional view illustrating the transmission bar which connects the diaphragm to the string.

In the accompanying drawings wherein is illustrated the preferred form of my invention, the numeral 10 designates the body of the violin which is preferably constructed from a wood similar to that provided in the construction of violins. While this form of body portion has been shown, it is to be realized that I do not limit myself to this,

and that other forms can be provided and used as well.

A neck 11, which is curved at its end as shown at 12, is provided with a plurality of transversely disposed frets 13, and is connected with the body. The neck has extending vertically therethrough a tuning pin 14 about which is fastened one end of a string 15, the latter having its other end secured to a tail piece 16 carried upon the body.

The above mentioned elements constitute broadly the violin portion of the device, and the elements hereinafter appearing have relation to the improvement constituting my invention.

A diaphragm sound box or casing having a base 17, is mounted upon the body portion 10 and carries therein a sleeve of rubber 18; the latter serves to support a diaphragm 19. Projecting upwardly from the base portion and directly above the upper portion of the diaphragm is a horn 20 which serves to amplify the sound. A transmission bar 21 has one of its ends secured to the diaphragm, as at 22, the other end thereof being in direct connection with the string, as at 23, to serve as a bridge and to transmit the vibrations of the string to the diaphragm. A pair of lugs 24 extend outwardly from the base and support a resilient plate 25, the said plate extending between said lugs and yieldingly supporting the transmission bar 21.

From the above, it is thought that the advantages and novel features of my invention will be readily comprehended.

I desire to be understood that I may make slight changes in the construction and in the arrangement and combination of parts without departing from the spirit of my invention, provided, however, such changes fall within scope of the subjoined claim.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

A violin including a body, a string mounted thereon, a sound box carried by said body and having an opening in its

periphery, a diaphragm in the sound box, and an amplifying horn engaging over the opening in the periphery of the sound box.
a transmission bar carried by the sound box having one of its ends in engagement with the diaphragm and the opposite end in direct connection with the string of the violin to serve as a bridge and to transmit vibrations of the string to the diaphragm,

HEDLEY WATTY.

Witnesses:

MILTON G. WIGGINS,
BESSIE E. WIGGINS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

... - PHONOGRAPH,
1,184,268-----G. L. Stone,
Patented-May 23rd, 1916.
Filed-March 17th, 1910.

1,184,268.

Patented May 23, 1916.

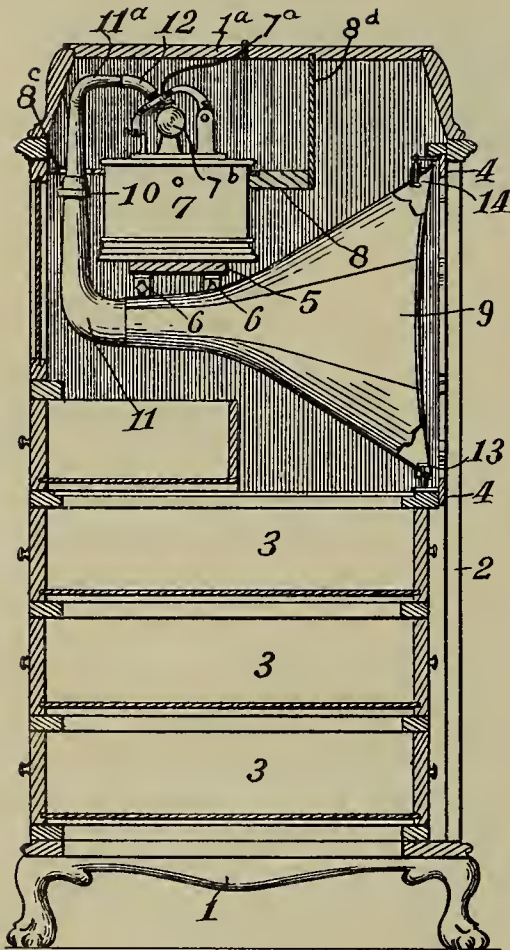


Fig. 1.

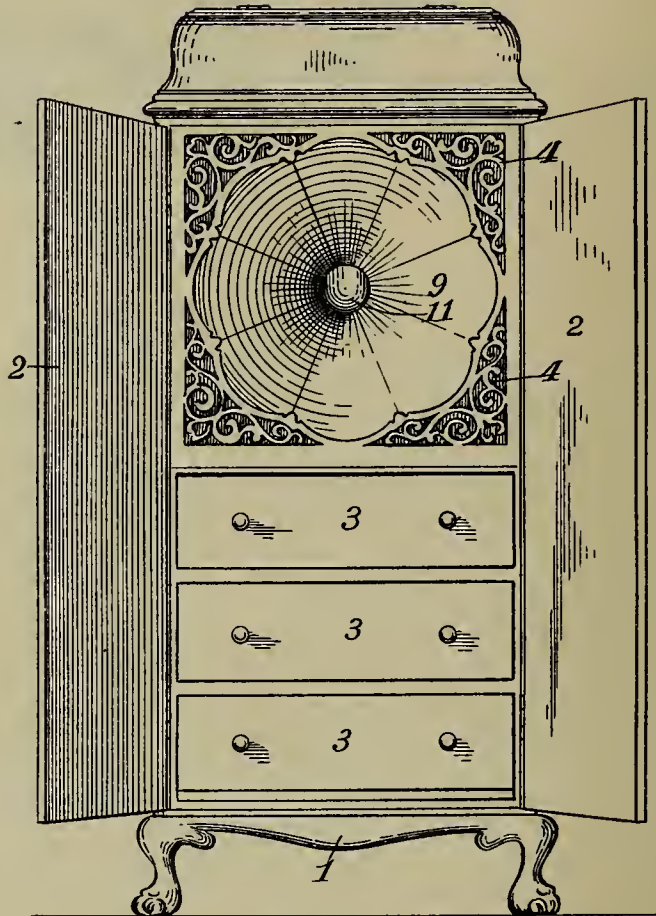


Fig. 2.

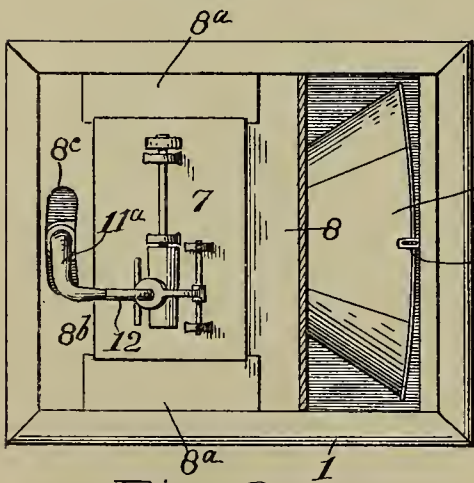


Fig. 3.

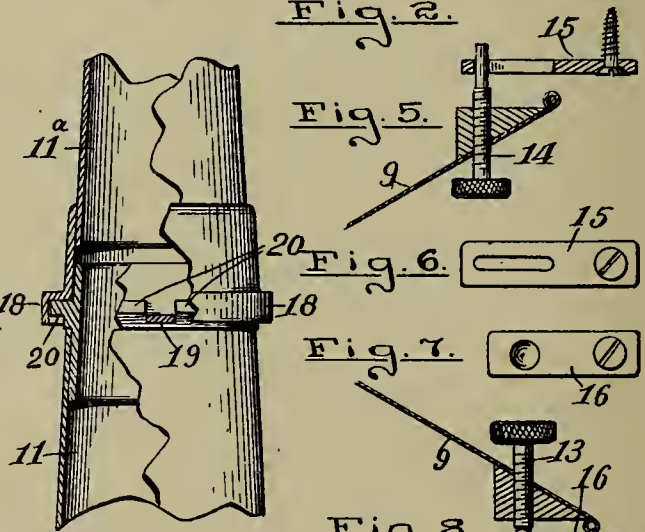


Fig. 4.

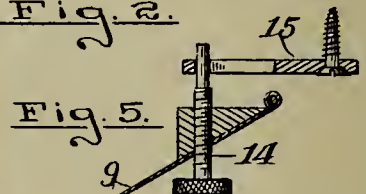


Fig. 5.

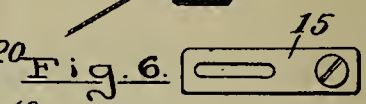


Fig. 6.

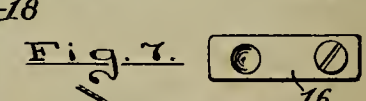


Fig. 7.



Fig. 8.

Witnesses
 H. O. Van Antwerp.
 Georgiana Chace

Inventor
 George L. Stone
 By Luther V. Moulton
 Attorney

UNITED STATES PATENT OFFICE.

GEORGE L. STONE, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR TO THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

1,184,268.

Specification of Letters Patent.

Patented May 23, 1916.

Application filed March 17, 1910. Serial No. 550,037.

To all whom it may concern:

Be it known that I, GEORGE L. STONE, a citizen of the United States of America, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to phonographs and its object is to provide improved means for pivotally mounting the horn or sound conveyor of the phonograph and to provide a device having various new and useful features hereinafter more fully described and particularly pointed out in the claims, reference being had to the accompanying drawings, in which:

Figure 1 is a side elevation of a device embodying my invention mounted in a cabinet with parts broken away to show the construction; Fig. 2 a front elevation of the same; Fig. 3 a plan view with the top removed; Fig. 4 an enlarged detail of the joint in the neck of the horn; Fig. 5 an enlarged detail of the upper pivot of the horn; Fig. 6 a detail of the upper pivot plate; Fig. 7 a detail of the lower pivot plate; and, Fig. 8 a sectional detail of the lower pivot.

Like numbers refer to like parts in all of the figures.

1 represents a case or cabinet of suitable dimensions and preferably provided with doors 2 to close or open the front thereof. Substantially the lower half of the case is provided with a series of drawers 3, which are arranged to slide out either at the front or at the rear of the case and are adapted to serve as receptacles for the records.

At the front of the upper part is an open ornamental fretwork 4 surrounding the open end of the horizontal bell 9 of the horn or sound conveyor. This bell is reduced somewhat at the sides of the front edge to permit of pivoting the horn close to the fretwork at the top and bottom and to allow it to swing laterally at the rear on the pivots hereafter described.

5 is a shelf to support the phonograph or sound reproducing or recording means 7,

and this shelf is preferably mounted on vertically adjustable brackets 6 to adapt the same to different sizes of machines.

8 is a transverse bar extending across the cabinet in front of the phonograph to locate the same and in conjunction with this are other adjusting plates 8^a at the ends of the machine, and at 8^b at the rear of the machine. These plates are removable to insert and remove the machine and adapted to engage and hold the machine in fixed relation and proper position relative to the other parts. The rear plate 8^b has a segmental slot 8^c therein through which the neck 11 of the horn projects and swings horizontally about the axis of the pivots. A vertical plate 8^d fits closely the bar 8, and the top and sides of the cabinet; so that the cabinet is divided into two compartments, one of which contains the reproducer 7^a and the record support 7^b and the other of which contains the bell of the horn.

The horn extends beneath the shelf 5 and is thence curved upward to extend vertically through the slot 8^c. Near this slot this vertical portion is provided with a joint, as illustrated in Fig. 4, whereby the upper end may be readily detached as occasion requires, and whereby also the upper end 11^a of the neck of the horn is permitted to oscillate about its vertical axis.

To adapt the small end of the neck 11^a to move in a right line to conform to the movement of the reproducer along the cylinder on the machine, the upper end of the neck is bent from vertical to horizontal in a direction substantially parallel with the cylinder, and is thence again bent laterally in a horizontal direction with the small end directed forward substantially at right angles to the axis of the record support and cylinder and coupled to the reproducer by a flexible tube 12 in the usual manner. Thus as the horn swings on its pivots at the front or open end of the bell, this bent upper end of the neck will oscillate on its vertical axis and permit the small end which is connected to the reproducer to move in a right line, the flexibility of the coupling 12 being sufficient to permit the forwardly projecting end to turn slightly out of the right-angle position relative to the axis of the cylinder.

At the top and bottom of the open end of the bell 9, I insert vertical pivot pins, each being adjustable vertically in the horn, preferably by screw threads thereon, but for a limited adjustment the upper pivot pin may be fixed. The lower pivot pin 13 is pointed and rests in a socket in a pivot plate 16 and the upper pin is inserted in a slotted pivot plate 15, whereby the horn oscillates about the vertical axis of these pins, and a forward movement of the pin 14 in the slot in the plate 15 permits raising the rear end of the horn to transfer the reproducer clear of the cylinder to starting position. The plates 15 and 16 are secured to the cabinet adjacent the upper and lower portions respectively of the fretwork. During the forward movement of the horn, the latter moves about a horizontal axis through the point of the pivot pin 13.

The rotative joint 10 comprises an outwardly projecting flange 20 on the upper end of the part 11, provided with openings or recesses at regular intervals through which inwardly projecting lugs 19 on a surrounding band 18 are inserted, and the upper part 11^a thus rotatively mounted and held in position when the lugs 19 are turned under the flange 20 and is readily detached by turning the lugs opposite said openings.

From the foregoing the operation of my device is obvious without further description.

It is to be understood that many modifications may be made in the specific structure disclosed above without departing from the spirit of my invention.

What I claim is:

1. In a device of the class described, the combination with a cabinet, of a reproducer and a record support, a sound conveyer extending rearwardly from said reproducer, then downwardly past said record support and terminating in a forwardly directed amplifying exit portion arranged within said cabinet, and a mounting for said conveyer permitting oscillation thereof about a vertical axis without movement transverse to said axis, said mounting comprising pivot means coacting with said exit portion, substantially as described.

2. In a device of the class described, the combination of a cabinet having an opening therein, of sound reproducing means comprising a reproducer, and a sound conveyer extending rearwardly from said reproducer, then downwardly past said sound reproducing means and terminating in a forwardly directed amplifying exit portion adjacent said opening and pivoted at its outer end for oscillation about a vertical axis located a substantial distance from said reproducer, said exit portion being reduced in length at its sides to permit free oscillation of said

conveyer close to the adjacent wall of the cabinet, substantially as described.

3. In a device of the class described, the combination with a reproducer and a record support, of a sound conveyer connected with said reproducer and extending therefrom, then downwardly past said record support, and terminating in a forwardly directed amplifying exit portion, and pivot means coacting with the outer end of said amplifying portion and supporting said conveyer for oscillation about a vertical axis located a substantial distance from said reproducer, said conveyer being movable to permit the raising or lowering of the reproducer with respect to the record support, substantially as described.

4. In a device of the class described, the combination with a cabinet having an opening therein, of a reproducer and a record support, a sound conveyer connected with said reproducer and extending therefrom, then downwardly past said record support, and terminating in a forwardly directed amplifying exit portion communicating with said opening, and pivot means coacting with the outer end of said exit portion and supporting said conveyer for oscillation about a vertical axis located a substantial distance from said reproducer, said conveyer being movable to permit the raising or lowering of the reproducer with respect to the record support, substantially as described.

5. In a device of the class described, the combination of a sound reproducer movable in a straight line, and a sound conveyer flexibly connected with said reproducer and comprising a plurality of sections pivotally connected for relative movement about a vertical axis, the exit section of said conveyer being pivoted at spaced points for oscillation about a vertical axis adjacent the outer end of the conveyer, substantially as described.

6. In a device of the class described, the combination of sound reproducing means comprising a reproducer movable in a straight line, a sound conveyer flexibly connected with said reproducer, and extending rearwardly therefrom, then vertically past said sound reproducing means, and terminating in a forwardly directed amplifying exit portion pivoted for oscillation about a vertical axis located a substantial distance in front of said reproducer, the vertically extending portion of said conveyer being provided with a joint dividing the conveyer into two sections movable relatively to each other about the axis of said vertically extending portion, substantially as described.

7. The combination of a horn pivoted adjacent its exit on a vertical axis, and sound reproducing means comprising a reproducer and record support supported above the exit

portion of the horn, said horn being bent upwardly at the rear of the sound reproducing means and provided with a joint dividing the horn into two sections movable
 5 relative to each other about a vertical axis, said horn also being bent near its small end horizontally and substantially parallel to the record support and then forwardly toward said support, and being flexibly coupled to
 10 the reproducer, substantially as described.

8. The combination of sound reproducing means comprising a reproducer and a record support, a horn having a bell and pivoted on a vertical axis at the front of the bell,
 15 thence extending beneath said sound reproducing means and thence upwardly, said horn having an upper portion extended twice at substantially right angles in a horizontal direction and directed at its smaller
 20 end toward said reproducer, and means for connecting said end to said reproducer.

9. The combination of a phonograph comprising a reproducer, a horn extending beneath the phonograph and thence upwardly
 25 and forwardly and connected to the reproducer, pivot pins respectively at the top and bottom of the front of the horn, a socket plate to receive one of the pins, and a slotted plate to receive the other pin, whereby the
 30 rear of the horn swings horizontally and can be moved vertically.

10. The combination of a phonograph comprising a record support, a horn pivoted at the front and thence extended rearwardly beneath the phonograph, thence upwardly behind the same, thence horizontally
 35 substantially parallel to the record support, and finally toward said support, and adjusting plates engaging the phonograph to adjust the same relatively to the horn.

11. The combination of sound reproducing means comprising a reproducer and a record support, a sound conveyer extending rearwardly from said reproducer, then vertically
 45 past said sound reproducing means, and terminating in a forwardly directed amplifying exit portion, and means coacting with spaced points on said exit portion for supporting said conveyer, said last named
 50 means comprising a plurality of pivot pins, and a slotted member in which one of said pins is movable to permit elevation of the small end of the conveyer and of the reproducer, substantially as described.

12. The combination of sound reproducing means comprising a reproducer and a record support, a sound conveyer extending rearwardly from said reproducer, then vertically
 55 past said sound reproducing means, and terminating in a forwardly directed amplifying exit portion, and means coacting with spaced points on said exit portion for supporting said conveyer, said last named
 60 means comprising a plurality of pivot pins,

and a slotted member in which one of said
 65 pins is movable to permit elevation of the small end of the conveyer and of the reproducer, one of said pivot pins being adjustable to adjust the conveyer vertically, substantially as described.
 70

13. A phonograph horn having a pivoted bell, and an upwardly projecting portion having a joint dividing the horn into two sections movable relatively to each other
 75 about a vertical axis, said horn having its small end extended horizontally substantially at right angles in two places.

14. In a device of the class described, the combination with sound reproducing means, of a sound conveyer extending rearwardly
 80 from said means, then vertically past the same, and terminating in a forwardly directed amplifying exit portion, and means for pivoting opposite sides of said exit portion to permit oscillation of said exit portion
 85 about a vertical axis located a substantial distance from said sound reproducing means, substantially as described.

15. In a device of the class described, the combination with a reproducer and a record
 90 support, of a sound conveyer connected with said reproducer and extending therefrom, then vertically past said record support, and terminating in a forwardly directed amplifying exit portion, and means
 95 for pivoting opposite sides of said exit portion to permit oscillation of the said exit portion about a vertical axis located a substantial distance in front of said reproducer, said conveyer and reproducer being movable
 100 for effecting the disengagement of the reproducer from a record carried by said support, substantially as described.

16. In a device of the class described, the combination with sound reproducing means
 105 comprising a reproducer and a record support, of a sound conveyer connected with said reproducer and extending rearwardly therefrom, then vertically past said means, and terminating in a forwardly directed
 110 amplifying exit portion, and pivot means coacting with opposite sides of said amplifying exit portion and supporting said conveyer for oscillation about a vertical axis located a substantial distance from said
 115 reproducer, said conveyer being movable about a substantially horizontal axis to permit the raising or lowering of the reproducer with respect to the record support, substantially as described.
 120

17. The combination of a reproducer, a horn connected to said reproducer, and means coacting with spaced points on said horn for supporting the same, said means
 125 comprising a plurality of pivot pins, and a slotted member in which one of said pins is movable to permit elevation of the small end of the horn and of the reproducer, one

of said pivot pins being adjustable to adjust the horn vertically, substantially as described.

18. In a device of the class described, the combination with a reproducer and a record support, of a sound conveyer connected with said reproducer and extending therefrom, then vertically past said record support, and terminating in a forwardly directed amplifying exit portion, and pivot means coacting with said exit portion at points respectively at the top and bottom of said exit portion and supporting said conveyer for oscillation about a vertical axis located a substantial distance from said reproducer, said conveyer and reproducer being movable for effecting the disengagement of the reproducer from a record carried by said support, substantially as described.

19. In a device of the class described, the combination with a reproducer and a record support, of a sound conveyer connected with said reproducer and extending therefrom, then downwardly past said record support, and terminating in a forwardly directed amplifying exit portion, and pivot means coacting with the outer end of said amplifying portion and supporting said

conveyer for oscillation about a vertical axis located a substantial distance from said reproducer, said conveyer and reproducer being movable for effecting the disengagement of the reproducer from a record carried by said support, substantially as described.

20. In a device of the class described, the combination with a reproducer and a record support, of a sound conveyer connected with said reproducer and extending therefrom, then downwardly past said record support, and terminating in a forwardly directed amplifying exit portion, and pivot means coacting with the outer end of said amplifying portion and supporting said conveyer for oscillation about a vertical axis located a substantial distance from said reproducer, said conveyer and reproducer being movable in a vertical plane for effecting the disengagement of the reproducer from a record carried by said support, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE L. STONE.

Witnesses:

GEORGIANA CHACE,
LUTHER V. MOULTON.

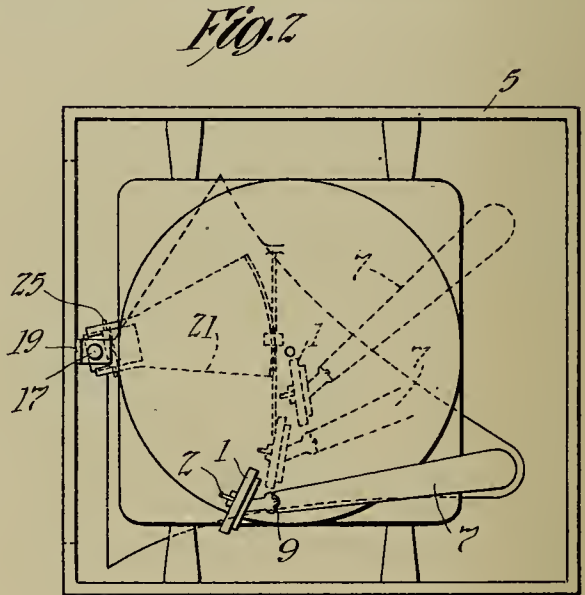
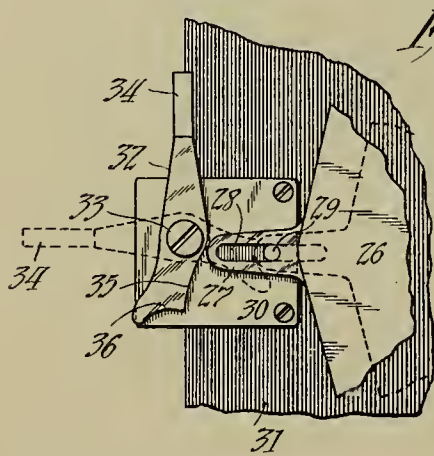
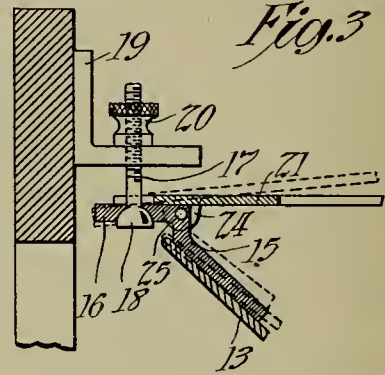
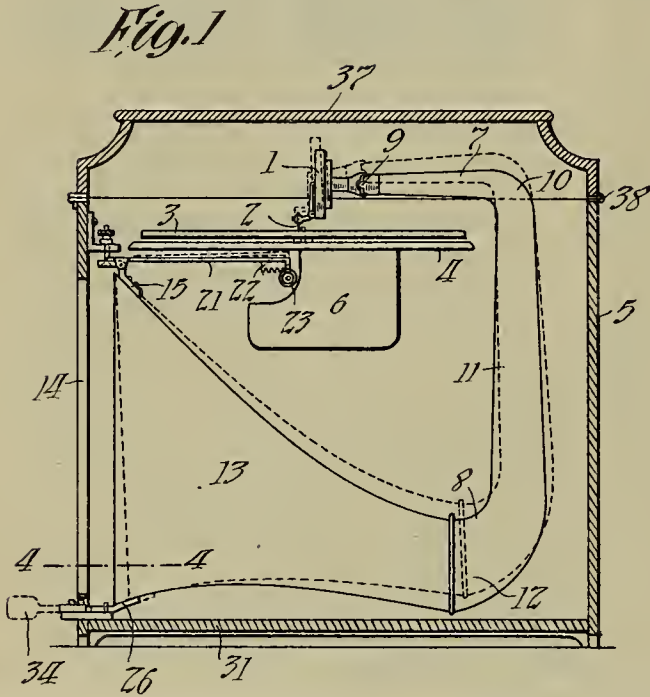
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH OR TALKING MACHINE,
1,184,332-----T. A. Edison,
Patented-May 23rd, 1916.
Filed-December 7th, 1910.

T. A. EDISON.
 PHONOGRAPH OR TALKING MACHINE.
 APPLICATION FILED DEC. 7, 1910.

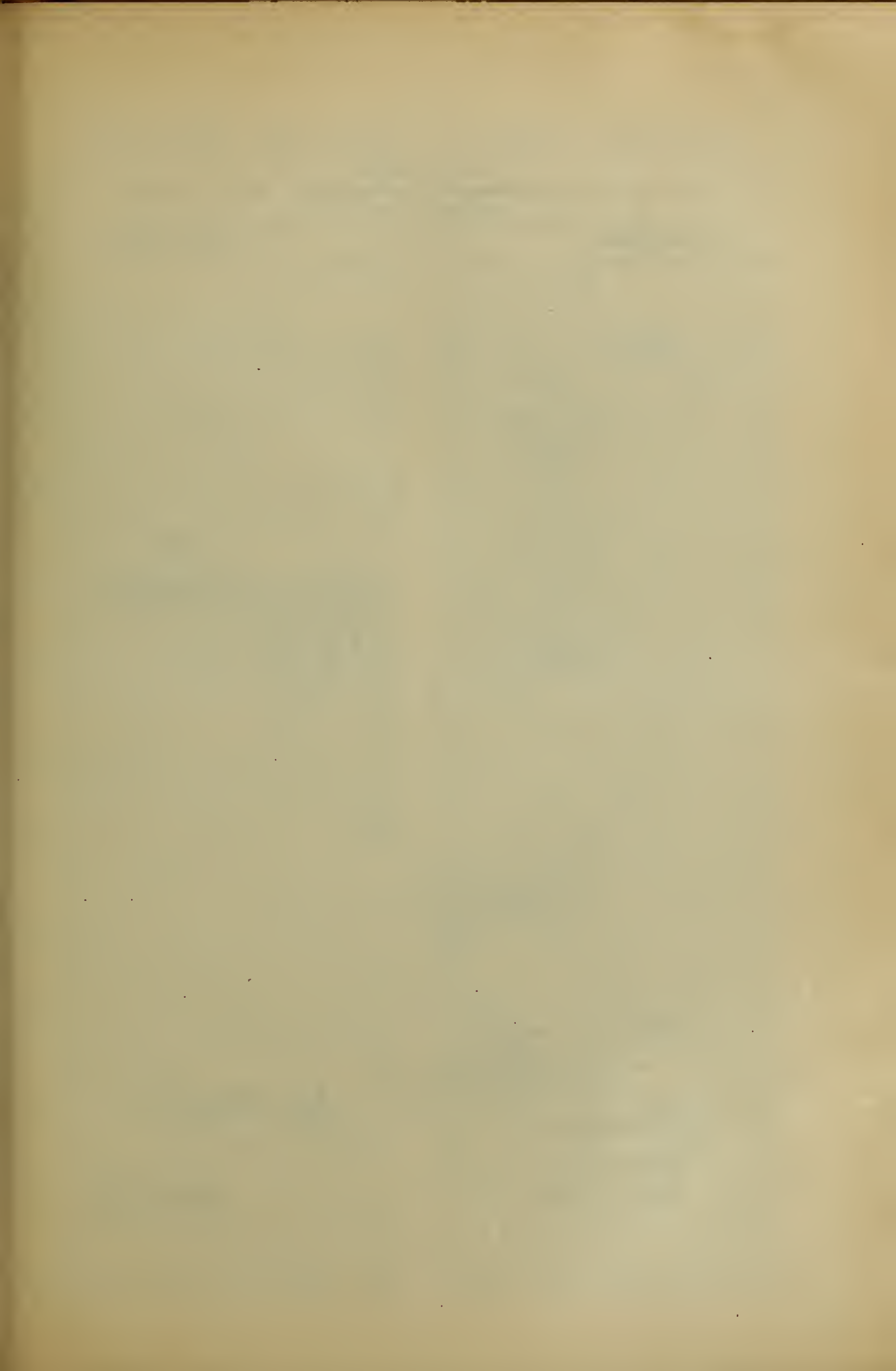
1,184,332.

Patented May 23, 1916.
 2 SHEETS—SHEET 1.



Witnesses:
 Frank D. Lewis
 Dyer Smith

Inventor:
 Thomas A. Edison
 by Frank L. Allen
 His Atty.



T. A. EDISON.
 PHONOGRAPH OR TALKING MACHINE.
 APPLICATION FILED DEC. 7, 1910.

1,184,332.

Patented May 23, 1916.
 2 SHEETS—SHEET 2.

Fig. 5

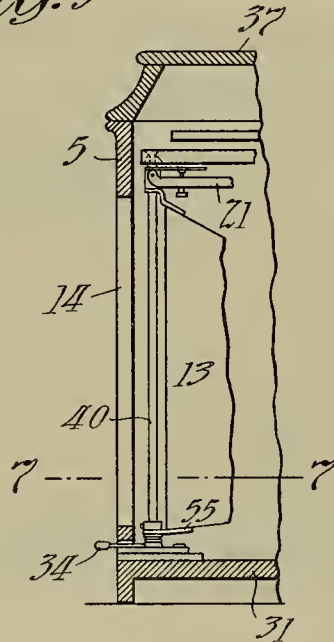


Fig. 6

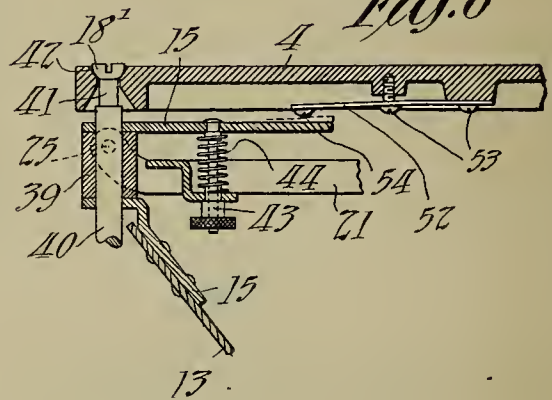


Fig. 7

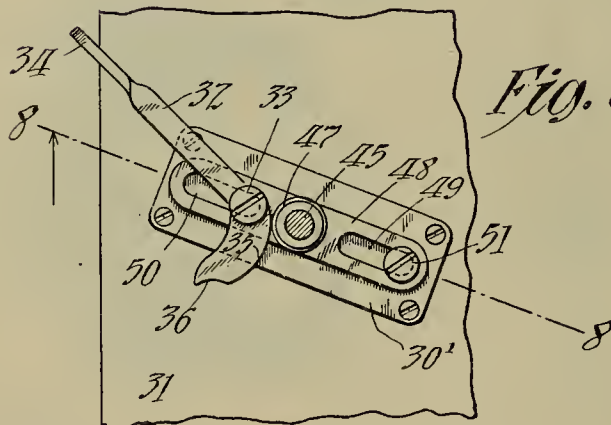
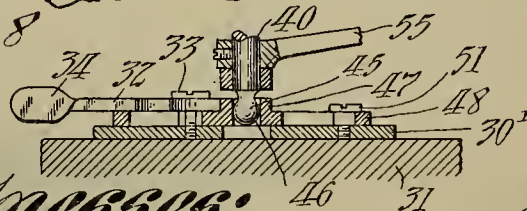


Fig. 8



Witnesses:
 Frank Lewis
 Dyer Smith

Inventor:
 Thomas A. Edison
 by Frank L. Lewis
 His Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY.

PHONOGRAPH OR TALKING-MACHINE.

1,184,332.

Specification of Letters Patent.

Patented May 23, 1916.

Application filed December 7, 1910. Serial No. 596,007.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, Essex county, New Jersey, have invented certain new and useful Improvements in Phonographs or Talking-Machines, of which the following is a description.

My invention relates to phonographs or talking machines particularly of the type in which disk or flat records are operated upon, and preferably in which the sound conveying and amplifying horn is inclosed within a suitable cabinet.

In my invention the sound reproducer is carried by the sound conveyer which is connected with the interior of the reproducer, the arm of the sound conveyer to which the reproducer is secured preferably being integral and continuous with the large amplifying horn. The conveyer is pivotally mounted or suspended adjacent the large exit end of the amplifier in such a manner that the whole conveyer and reproducer oscillate about the pivotal means referred to during the reproduction of the record, the mounting of the horn or amplifier being preferably such as also to permit a simple manipulation or adjustment of the same to remove the reproducer from operative position when it is desired to change the record. Also, in the preferred embodiment of my invention, the lateral movement or oscillation of the sound conveyer and reproducer during the reproduction of a record is obtained by the engagement of mechanical means with co-acting driving means, the said mechanical means being secured to the sound amplifier or so mounted as to cause the desired feeding movement of the latter, this mechanical means and the driving means being disengaged by the same adjustment of the sound conveyer, which places the reproducer in inoperative position.

Other objects of my invention reside in the construction of parts and combinations of elements hereinafter more fully disclosed in the following specification and appended claims.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawings forming part of this specification, and in which—

Figure 1 represents a vertical cross section and side elevation of a phonograph or talking machine comprising an inclosing cabinet

and embodying one form of my invention; Fig. 2 represents a top plan view of the same, the cover of the cabinet being removed; Fig. 3 represents an enlarged vertical sectional detail of the means for pivotally supporting the upper side of the horn or sound amplifier, as shown in Fig. 1; Fig. 4 is an enlarged section taken upon line 4—4 of Fig. 1; Fig. 5 is a partial sectional and side elevational view similar to Fig. 1 of a modification of my invention; Fig. 6 is an enlarged sectional detail of the means for pivotally supporting the upper side of the horn or sound amplifier used in connection therewith; Fig. 7 is an enlarged sectional view taken on line 7—7 of Fig. 5; and Fig. 8 is a section taken upon line 8—8 of Fig. 7, certain parts being shown in side elevation.

Referring to the drawings, the sound reproducer 1 carries stylus 2 adapted to reproduce a record carried by turn-table or record support 3, which is mounted upon horizontal support or shelf 4 within the cabinet 5. A suitable motor for rotating turn-table 3 is mounted within casing 6 supported from platform 4. The reproducer 1 is secured to a horizontal arm 7 of sound conveyer and amplifier 8 by a joint 9 permitting a limited up and down and also lateral movement of the reproducer with respect to the arm 7 of the sound conveyer while tracking the record. This joint may be, and preferably is, constructed as shown and described in U. S. Patent to Adolph F. Gall, No. 1,119,269, dated December 1, 1914. The arm 7 of the sound conveyer is rearwardly directed from the reproducer, as shown, to a bend 10, whence it descends vertically past the platform 4 and motor casing 6, being joined by the curved portion 12 to the forwardly directed amplifying exit portion 13 of the horn or conveyer, from the mouth of which the sound reproduced and conveyed is given forth through the opening 14 in the front side of the cabinet into the atmosphere. The sound conveyer and amplifier 8 extends, as shown, from the joint 9 to its mouth without containing a flexible joint. My invention is not limited to this particular construction, but I consider it preferable.

In the embodiment of my invention shown in Figs. 1 to 4 inclusive, the reproducer and sound conveyer are supported as follows:—A bracket 15 is secured to the upper side of the amplifying portion 13 of conveyer 8 adjacent the mouth of the

conveyer, this bracket or lug having a horizontally disposed portion 16, the lower side of which is provided with a spherical or curved recess with a cylindrical opening extending from the same to the upper side of the horizontal member 16. A bolt 17 having a rounded or semi-spherical protuberance 18 upon the lower end thereof is passed through this opening so that the rounded projection 18 is mounted within the curved or spherical recess referred to, the recess and rounded projection 18 being formed to closely fit each other. Bolt 17 is passed through an opening through the horizontal portion of a bracket 19 secured to the front wall of cabinet 5, a knurled nut 20 being threaded upon the upper end of bolt 17 and resting upon the horizontal arm of bracket 19. A sector 21 having gear teeth 22 upon the lower side thereof, as shown, is secured to bracket 15, the gear 22 which is preferably a worm wheel being adapted to engage with a gear, preferably a worm 23, which is rotated by appropriate gearing from the motor contained within casing 6. Preferably, sector 21 is made adjustable with respect to bracket 15 as by forming the same with depending ears 24, through which passes a horizontal pivot pin 25 supported by the bracket 15.

To the lower side of the exit portion 13 of the amplifier is secured a bracket 26 having a portion 27 extending forwardly beyond the mouth of the horn or amplifier 13. This forwardly extending portion 27 is provided with a vertical slot 28 extending in the direction of the axis of the amplifier 13, within which slot engages a vertical pin 29 rising from a plate 30 secured to the upper side of the bottom 31 of the cabinet 5. A lever 32 is pivotally mounted upon a vertical screw or stud 33 secured to the plate 30. This lever 32 is provided with a handle 34 and two curved or cam surfaces 35 and 36.

When the parts of the device are assembled in position, the nut 20 is adjusted until the gear teeth 22 of sector 21 are in position to engage worm 23 and reproducer 1 is in proper position for stylus 2 to engage a record upon support 3. The reproducer and sound conveyer are then in the position indicated by the full lines in Fig. 1 suspended by bolt 17 from bracket 19. Gravity tends to hold the sound conveyer in this position with the pin 29 contacting the inner end of slot 28 in projection 27 of bracket 26. In this position the lower side of projection 27 may rest lightly upon plate 30, and when the machine is operated, worm 23 drives gear 22 to cause sound conveyer 8 to swing about bolt 17 and pin 29 which are in vertical alinement with each other as centers, reproducer 1 thus being fed across the record. The weight of the sound conveyer is supported by bolt 17 and by the pressure of

the inner end of slot 28 upon pin 29, the weight of reproducer 1 alone exerting pressure upon the record through stylus 2. In this feeding movement, bracket 15 turns upon bolt 17 as upon a simple pivot, and the coaction of pin 29 and slot 28 causes a steady movement of the conveyer. The gear teeth 22 are held in mesh with worm 23 by the weight of sector 21 pivoted at 24, or a spring may be used if desired to hold the sector in engagement with the worm, as is illustrated in Fig. 6. The pivotal connection of sector 21 with amplifier 13 permits the easy engagement of the sector with the worm when the stylus 2 is first placed in contact with the record groove of the sound record.

In Fig. 2 of the drawings the reproducer 1 and arm 7 of the sound conveyer are shown in full lines in position for stylus 2 to start the reproduction of the record at the outer edge thereof, the reproducer and arm 7 also being shown in dotted lines in intermediate position and in the position occupied when the reproduction is being completed. The parts should be so arranged that the stylus will track the record grooves centrally at all times. This may be arranged in the manner shown in Fig. 2, in which the face of the diaphragm is approximately radial in intermediate position between the beginning and end of a record, and varies slightly from the radial on each side of the said intermediate position.

When it is desired to disengage the feed and lift the reproducer to disengage the stylus from the record, the sound conveyer 8 may be oscillated in a vertical direction about the ball and socket joint formed by the ball or curved projection upon the end of bolt 17 and the socket or curved recess in horizontal member 16, within which bolt 17 is seated. This may be accomplished by raising the cover 37 of the cabinet, the cover being pivoted at 38 to the cabinet, and lifting the horizontal arm 7 of the sound conveyer, or it may be accomplished by manipulation of handle 34. When handle 34 is rotated from the full line to the dotted line position shown in Fig. 4, the curved surface 35 of the lever contacts the curved end of the projection 27 upon the bracket 26 secured to the amplifying portion 13 of the conveyer, forcing the conveyer to swing rearwardly about the ball 18 seated in its socket as described, the conveyer and reproducer moving from the full line to the dotted line position in Fig. 1. When handle 34 has been moved into the dotted line position, curved surface 36 on the end of lever 32 coacts with the end of projection 27 to hold or lock the horn in its raised position. In this position the gear 22 will be out of mesh with worm 23, and stylus 2 will be out of contact with the record upon turn-table 3. When it is again desired to play a record,

reproducer 1 is swung laterally about the vertical pivots to properly position stylus 2 with respect to the sound record, and handle 34 is moved back into the full line position shown in Fig. 4.

It may be noted that the engagement of surface 35 of lever 32 with the end of projection 27 upon bracket 26 causes the lateral pivotal movement of the sound conveyer about pin 29, the projection 27 acting as a lever pivoted at 29 and the reproducer moving toward the outside of the record or in proper position to start the reproduction of a record of the type in which the reproduction is from the periphery toward the center. If, however, the cabinet be seated upon an uneven surface, the free pivotal engagement of slot 28 with pin 29 would permit undesired lateral swinging of the sound conveyer and reproducer when the conveying means were disengaged. Hence, it may be advisable to provide frictional means for somewhat resisting the free lateral pivotal movement of the sound conveyer, as will be described in connection with Fig. 6 of the drawings.

In Figs. 5 to 8 inclusive I have illustrated a slight modification of my invention, in which the bracket 15 is secured to a member 39 to which the sector 21 is pivotally secured at 25, as shown. The vertical bolt 17 of the first described embodiment of my invention is replaced by a vertical rod 40, the upper end of which passes through and is secured to bracket 15 and member 39. A screw 41 is secured to the upper end of rod 40 and has a curved or semi-cylindrical head 18' which is seated within a similarly curved recess 42 in the upper face of horizontal member 4 of the cabinet, screw 41 passing through a conical opening connecting the seat or recess 42 with the lower surface of member 4. A ball and socket joint is thus provided similar to that provided by the curved head 18 upon bolt 17 in Fig. 3 and its socket. The position of sector 21 with respect to bracket 15 may be adjusted by means of screw 43 passing through a horizontal arm of bracket 15 and sector 21 and having a knurled nut threaded upon the end thereof. A spiral spring 44 may be mounted upon screw 43 between the horizontal portion of bracket 15 and the flange of sector 21 through which screw 43 passes, by which means sector 21 is held in engagement with worm 23 by adjustable spring pressure. The vertical adjustment of the sound conveyer may also be regulated by means of tightening or loosening screw 41. In this form of my invention, the vertical rod 40 preferably extends all the way to the lower side of the conveyer in front of the mouth thereof, and is provided at its lower end with an engaging surface 45 which is preferably spherical. Ball 45 engages within a recess 46 in a member 47 secured upon

or integral with a slide 48 provided with vertical slots 49 and 50 therein within which are mounted pin 51 and the pivot pin 33 of lever 32 respectively secured to plate 30' mounted upon the upper side of bottom 31 of cabinet 5. A flat spring 52 is preferably secured to the under side of the frame member 4, as by screws 53 and carries a button or projection 54 adapted to press frictionally on the upper side of the horizontal portion of bracket 15, as shown, to act as a friction means to resist undesired lateral oscillation of the conveyer when the feed is disengaged. A bracket 55 is secured to the lower side of the amplifying end 13 of the sound conveyer and is also secured to the lower end of the rod 40, as shown. In this construction, the operative faces 35 and 36 of lever 32 engage the cylindrical surface of member 47 concentric with the vertical pivotal rod 40, so that there is no tendency to swing the sound conveyer laterally when operating lever 32. When it is desired to disengage the feed and lift the stylus from contact with the record in this form of my invention, the lever 32 is rotated to the left, referring to Fig. 7, surface 35 of the lever camming member 47 to swing rod 40 and sound conveyer 8 about the ball and socket joint 18', 42 just as in the first embodiment of my invention, slide 48 moving upon screws 51 and 33, and surface 36 of lever 32 coacting with member 47 to lock the sound conveyer in its raised position.

It is to be understood that my invention is not limited to the exact details of the embodiments of my invention here disclosed, but may be varied within the terms of the appended claims without departing from the spirit of the invention. In the construction shown, the sound conveyer is supported adjacent its large end so that little force is required to swing the same in a vertical direction about the upper pivot of the conveyer. Obviously, it is not essential, if a ball and socket or other universal joint for supporting the amplifier be used, that the same be located adjacent the upper portion of the amplifier, with lever 32 adjacent the lower side of the amplifier. Any manner of supporting the amplifier, permitting the necessary movements thereof, as described, and means for moving the same to adjust the position of the feeding devices, and the reproducer, as claimed, are within the scope of my invention.

Having now described my invention, what I claim as new therein and desire to protect by Letters Patent is as follows:—

1. In a phonograph or talking machine, the combination of a sound conveyer having an amplifying mouth portion, a mounting for said conveyer permitting the same to move about a given axis, and means for moving said conveyer about said axis, said means

comprising a driving member and a sector carried by said mouth portion, said sector being movable upwardly and downwardly relatively to said conveyer and being held
5 by its weight in engagement with said driving member, substantially as described.

2. In a device of the class described, the combination of a record support, a reproducer in operative relation thereto, a cabinet, and a sound conveyer connected to said
10 reproducer and extending without flexible joint rearwardly from a point in proximity to said reproducer, then vertically past said record support, and then forwardly with respect to said support in the form of an amplifying exit portion located within said cabinet, said conveyer being pivoted for oscillation about a vertical axis located a substantial distance in front of said reproducer,
15 substantially as described.

3. In a device of the class described, the combination of a record support, a reproducer in operative relation thereto, and a sound conveyer connected to said reproducer and extending without flexible joint rearwardly from a point in proximity to said reproducer, then downwardly past said record support, and then forwardly with respect to said support in the form of an amplifying exit portion, said conveyer being pivoted for oscillation about a vertical axis located in close proximity to the extremity of said exit portion and a substantial distance in front of said reproducer, substantially as described.
35

4. In a device of the class described, the combination of a record support, a reproducer in operative relation thereto, a cabinet having an opening therein, and a sound conveyer connected to said reproducer and extending without flexible joint from a point above said record support and in proximity to said reproducer to the space below said record support, the said conveyer terminating in an amplifying exit portion located within said cabinet and directed toward said opening and being pivoted for oscillation about a vertical axis located adjacent said opening, substantially as described.
45

5. In a phonograph or talking machine, the combination with a reproducer and a sound conveyer carrying and connected with the same and having a substantially horizontal amplifying exit portion, of a frame member, a member suspended from said frame and supporting said conveyer at said exit end with a universal joint, and means rotatably supporting the lower side of said exit portion adapted to be moved in the axial direction of said exit portion, and lever means for so moving the same to swing said conveyer about said joint, against gravity, into an adjusted position, substantially as described.
60

6. In a phonograph or talking machine,

the combination of a reproducer, a sound conveyer carrying and connected with said reproducer and having an amplifying exit portion, driving means, and feeding means for said conveyer coacting with said driving means and pivoted to said exit portion for movement toward and away from said driving means, said conveyer being pivoted to permit movement thereof by said feeding means and being movable to disengage said feeding means from said driving means, substantially as described.
70 75

7. In a device of the class described, the combination of a record support, a reproducer in operative relation thereto, a sound conveyer connected to said reproducer and extending without flexible joint rearwardly from a point in proximity to said reproducer then downwardly past said record support, and then forwardly with respect to said support in the form of an amplifying exit portion, said conveyer being pivoted for oscillation about a vertical axis located at its exit end and a substantial distance from said reproducer, and means for moving said conveyer to raise or lower said reproducer with respect to said record support, substantially as described.
80 85 90

8. In a phonograph or talking machine, the combination with a reproducer, and a sound conveyer carrying the same and having an amplifying exit portion, of means for supporting one side of said conveyer at said exit portion with a universal joint, means rotatably supporting the opposite side of said conveyer at said exit portion, said last named means permitting said conveyer to be swung about said joint in the axial direction of said exit portion, and means coacting with said last named means for shifting said conveyer in said direction, substantially as described.
95 100 105

9. In a device of the class described, the combination of a record support, a reproducer in operative relation thereto, a cabinet, a sound conveyer connected to said reproducer and extending without flexible joint rearwardly from a point in proximity to said reproducer then downwardly past said record support, and then forwardly with respect to said support in the form of an amplifying exit portion located within said cabinet, means for pivoting said conveyer for oscillation about a vertical axis located at the exit end of said conveyer and a substantial distance from said reproducer, and feeding means for moving said conveyer about said axis to progress said reproducer across the surface of a record carried by said support, said conveyer being movable to render said feeding means inoperative, substantially as described.
110 115 120 125

10. In a device of the class described, the combination of a record support, a reproducer in operative relation thereto, a cabi-
130

net, a sound conveyer connected to said reproducer and extending without flexible joint rearwardly from a point in proximity to said reproducer then downwardly past
 5 said record support, and then forwardly with respect to said support in the form of an amplifying exit portion located within said cabinet, means for pivoting said conveyer for oscillation about a vertical axis
 10 located a substantial distance from said reproducer, feeding means for moving said conveyer about said axis to progress said reproducer across the surface of a record carried by said support, and unitary means
 15 for moving said conveyer to render said feeding means inoperative, and to lift said reproducer from the record surface, substantially as described.

11. In a phonograph or talking machine, the combination with a record support, a sound conveyer having an amplifying exit portion, a reproducer carried by said conveyer, means connected with said conveyer and comprising a rack and driving means
 20 therefor for feeding said reproducer across the surface of a record carried by said support, of means for supporting one side of said conveyer with a universal joint, means for rotatably supporting the opposite side
 25 of said conveyer, said last named means being adjustable to permit movement of the conveyer about said joint in a direction to cause the disengagement of said rack from said driving means and the disengagement
 30 of the reproducer from the record surface, and means for adjusting said last named supporting means to move said conveyer in said direction, substantially as described.

12. In a phonograph or talking machine, the combination with a reproducer and a record support, of a sound conveyer connected with said reproducer and carrying the same, extending rearwardly therefrom and then bending and extending forwardly
 45 with a sound amplifying exit portion, feeding means secured to the exit portion of said conveyer, coacting means and a motor connected to drive the same, and means supporting said conveyer adjacent its exit end
 50 arranged to permit pivotal movement of said conveyer about the same during the feeding movement of said reproducer and pivotal adjustment of said conveyer about the same to disengage said feeding means
 55 from said coacting means, substantially as described.

13. In a phonograph or talking machine, the combination with a reproducer, of a sound conveyer connected therewith and
 60 carrying the same and having an enlarged amplifying exit end extending in a generally horizontal direction, a member to which the upper portion of said exit end is pivotally secured, and means adapted to coact
 65 with the lower portion of said exit end to

swing said conveyer about said member into an adjusted position, substantially as described.

14. In a phonograph or talking machine, the combination with a reproducer, of a sound conveyer connected therewith and carrying the same and having an enlarged amplifying exit end extending in a generally horizontal direction, a member to which one portion of said exit end is pivotally secured and means adapted to coact with the side of said end opposite to said pivot to swing said conveyer about said pivot into an adjusted position, substantially as described.

15. In a device of the class described, the combination of a record support, a reproducer in operative relation thereto, a cabinet, a sound conveyer carrying said reproducer and extending rearwardly from a point in proximity to said reproducer, then downwardly past said record support, and then forwardly with respect to said support in the form of an amplifying exit portion located within said cabinet, and means co-acting with the exit end of said conveyer for lifting said conveyer to move said reproducer away from said record support, substantially as described.

16. In a phonograph or talking machine, the combination with a reproducer and a sound conveyer carrying and connected with the same and having a substantially horizontal amplifying exit portion, of a frame, means suspending the upper side of said exit portion from said frame, and a cam lever positioned to coact with the lower part of said exit portion, adapted on actuation to raise the center of mass of said conveyer and hold said conveyer in such elevated position, substantially as described.

17. In a phonograph or talking machine, the combination with a reproducer and a sound conveyer carrying and connected with the same and having a substantially horizontal amplifying exit portion, of a frame member, a member suspended from said frame and supporting said conveyer at said exit end with a universal joint, means rotatably supporting the lower side of said exit portion, means movable with said conveyer, and friction means applied to said last named means to resist lateral movement of said conveyer, substantially as described.

18. In a phonograph or talking machine, the combination with a record support, a reproducer, and a sound conveyer carrying said reproducer and movably mounted to permit free movement of the reproducer across and into and out of engagement with the surface of a record carried by said support, of means tending to yieldingly resist lateral movement of the conveyer during the movement of the reproducer above the por-

tion of the record to be reproduced, said means being rendered operative and inoperative respectively by the movements of the conveyer in disengaging the reproducer from and engaging the same with the record surface, substantially as described.

19. In a phonograph or talking machine, the combination with a record support, a reproducer, and a sound conveyer carrying said reproducer and movably mounted to permit free movement of the reproducer across and into and out of engagement with the surface of a record carried by said support, of friction means tending to resist lateral movement of the conveyer during the movement of the reproducer above the portion of the record to be reproduced, said means being rendered operative and inoperative respectively by the movements of the conveyer in disengaging the reproducer from and engaging the same with the record surface, substantially as described.

20. In a phonograph or talking machine, the combination of a record support, a reproducer, a pivotally supported sound conveyer connected thereto, and means for feeding said reproducer across the surface of a record carried by said support, said means comprising a driving member and a rack pivoted to said conveyer and movable by gravity into engagement with said driving member, and means for adjusting said rack on its pivot with respect to said member, substantially as described.

21. In a phonograph or talking machine, the combination of a cabinet, a sound conveyer within said cabinet and having an amplifying exit portion, a reproducer carried by said conveyer, a member to which one side of said exit portion is pivotally connected and means extending outside of said cabinet and adapted to coact with the side of said exit portion opposite to said member to swing said conveyer about said member into an adjusted position, substantially as described.

22. In a phonograph or talking machine, the combination of a cabinet, a sound conveyer within said cabinet and having an amplifying exit portion, feeding means secured to said conveyer, driving means coacting therewith, a member to which one side of said exit portion is pivotally connected, and means extending outside of said cabinet and adapted to coact with the side of said exit portion opposite to said member to swing said conveyer about said member to disengage said feeding means from said driving means, substantially as described.

23. In a phonograph or talking machine, the combination of a cabinet, a record support, a sound conveyer having an amplifying exit portion within said cabinet, a reproducer carried by said conveyer, means

connected with said conveyer and comprising a rack and driving means therefor for feeding said reproducer across the surface of a record carried by said support, of means for supporting one side of said conveyer with a universal joint, means for rotatably supporting the opposite side of said conveyer, said last named means being adjustable to permit movement of the conveyer about said joint in a direction to cause the disengagement of said rack from said driving means and the disengagement of the reproducer from the record surface, and means extending outside of said cabinet for adjusting said last named supporting means to move said conveyer in said direction, substantially as described.

24. In a phonograph or talking machine, the combination of a record support, a sound conveyer, a reproducer connected therewith, driving means, means coacting with said driving means for feeding said reproducer across the surface of a record carried by said support, and means tending to resist lateral movement of said conveyer, said last named means being automatically rendered operative and inoperative respectively by the disengagement of the said feeding means from and the engagement of the same with said driving means, substantially as described.

25. In a phonograph or talking machine, the combination of a record support, a sound conveyer, a reproducer connected therewith, driving means, means coacting with said driving means for feeding said reproducer across the surface of a record carried by said support, and friction means tending to resist lateral movement of said conveyer, said last named means being automatically rendered operative and inoperative respectively by the disengagement of the said feeding means from and the engagement of the same with said driving means, substantially as described.

26. In a device of the class described, the combination of a record support, a reproducer in operative relation thereto, a cabinet, and a sound conveyer to which said reproducer is connected for limited up and down and lateral movement, said conveyer extending without flexible joint rearwardly from a point in proximity to said reproducer, then downwardly past said record support, and then forwardly with respect to said support in the form of an amplifying exit portion located within said cabinet, the exit end of said conveyer being pivoted for oscillation about a vertical axis located a substantial distance in front of said reproducer, substantially as described.

27. In a phonograph or talking machine, the combination of a record support, a reproducer in operative relation thereto, a movable sound conveyer carrying said repro-

ducer, a stationary member and means co-acting with the exit end of said conveyer and with said member for shifting said conveyer to move said reproducer away from
5 said record support, substantially as described.

28. In a phonograph or talking machine, the combination of a record support, a reproducer in operative relation thereto, a
10 movable sound conveyer carrying said reproducer and having a mouth open to the atmosphere, feeding means for moving said conveyer to progress said reproducer across the surface of a record carried by said sup-
15 port, a stationary member and means co-acting with the exit end of said conveyer and with said member for shifting said conveyer to move said reproducer away from the record surface and to render said feed-
20 ing means inoperative, substantially as described.

29. In a phonograph or talking machine, the combination of a record support, a reproducer in operative relation thereto, a
25 cabinet, a movable sound conveyer carrying said reproducer and having its exit portion within said cabinet, and means coacting with said cabinet and the mouth of said conveyer for shifting said conveyer to move
30 said reproducer away from said record support, substantially as described.

30. In a phonograph or talking machine, the combination of a record support, a reproducer in operative relation thereto, a
35 cabinet, a movable sound conveyer carrying said reproducer and having its exit portion within said cabinet, a stationary member and means coacting with the exit end of said conveyer and with said member and ex-
40 tending without said cabinet for shifting said conveyer to move said reproducer away from said record support, substantially as described.

31. In a phonograph or talking machine, the combination of a record support, a reproducer in operative relation thereto, a
45 cabinet, a movable sound conveyer carrying said reproducer and having its exit portion within said cabinet, feeding means for moving said conveyer to progress said repro-
50 ducer across the surface of a record carried by said support, and means coacting with the mouth of said conveyer and said cabinet for shifting said conveyer to move said re-
55 producer away from the record surface and to render said feeding means inoperative, substantially as described.

32. In a phonograph or talking machine, the combination of a sound conveyer having
60 an amplifying mouth portion, a reproducer connected to said conveyer, a mounting for said conveyer permitting the same to move with said reproducer, feeding means carried
65 by said mouth portion, and means adapted to coact with said feeding means to drive

the same, said feeding means comprising a pivoted sector held by its weight in engagement with said driving means, substantially as described.

33. In a device of the class described, the
70 combination of a record support, a reproducer in operative relation thereto, a sound conveyer connected to said reproducer, and extending without flexible joint rearwardly from a point in proximity to said repro-
75 ducer, then downwardly past said record support, and then forwardly with respect to said record support in the form of an amplifying exit portion, means for pivoting said conveyer for oscillation about a vertical
80 axis located at the exit end of said conveyer and a substantial distance from said reproducer, and feeding means for moving said conveyer about said axis to progress said
85 reproducer across the surface of a record carried by said support, said conveyer being movable to render said feeding means inoperative, substantially as described.

34. In a phonograph or talking machine, the combination of a record support, a re-
90 producer in operative relation thereto, a movable sound conveyer carrying said reproducer, and means coacting with the mouth of said conveyer and movable relatively to said conveyer in a substantially
95 horizontal direction for shifting the same to move said reproducer away from said record support, substantially as described.

35. In a phonograph or talking machine, the combination of a record support, a re-
100 producer in operative relation thereto, a movable sound conveyer carrying said reproducer, and means comprising a lever co-acting with the mouth of said conveyer and movable about an axis at an angle to the
105 horizontal for shifting said conveyer to move the same away from said record support, substantially as described.

36. In a phonograph, the combination of a horizontal record support, an amplifier, a
110 reproducer carried thereby, means for supporting said amplifier for rotation on a vertical axis, said supporting means permitting oscillation of said amplifier on a hori-
115 zontal axis, a fixed support, and means mounted thereon and coöperating with said amplifier at its large end for oscillating said amplifier on its horizontal axis to an extent sufficient for the disengagement of the re-
120 producer from a record carried by said support, substantially as described.

37. In a phonograph, the combination of a horizontal record support, an amplifier, a
125 reproducer carried thereby, means for supporting said amplifier for rotation on a vertical axis adjacent the exit end of said amplifier, said supporting means permitting oscillation of said amplifier on a horizontal axis, a fixed support, and means mounted
130 thereon and coöperating with said amplifier

at its large end for oscillating said amplifier on its horizontal axis to an extent sufficient for the disengagement of the reproducer from a record carried by said support, substantially as described.

38. In a phonograph, the combination of a horizontal record support, an amplifier, a reproducer carried by said amplifier and movable upwardly and downwardly with respect thereto, means for supporting said amplifier for rotation on a vertical axis, said supporting means permitting oscillation of said amplifier on a horizontal axis, a fixed support, and means mounted thereon and cooperating with said amplifier at a point adjacent its large end for oscillating said amplifier on its horizontal axis to an extent sufficient for the disengagement of the reproducer from a record carried by said support, substantially as described.

39. In a phonograph, the combination of a horizontal record support, an amplifier, a reproducer stylus, supporting means for said stylus connected to said amplifier, means supporting said amplifier for rotation on a vertical axis, said amplifier supporting means permitting oscillation of said amplifier on a horizontal axis, a fixed support, and means mounted thereon and cooperating with said amplifier at its large end for oscillating said amplifier on its horizontal axis to an extent sufficient for the disengagement of the reproducer stylus from a record carried by said record support, substantially as described.

40. In a phonograph, the combination of a horizontal record support, a curved amplifier, a reproducer carried thereby, means for supporting said amplifier for rotation on a vertical axis, said supporting means permitting oscillation of said amplifier on a horizontal axis, a fixed support, and means mounted thereon and cooperating with said amplifier at its large end for oscillating said amplifier on its horizontal axis to an extent sufficient for the disengagement of the reproducer from a record carried by said support, substantially as described.

41. In a phonograph, the combination of a horizontal record support, an amplifier extending from the space above said support to the space below the same, a reproducer carried by said amplifier, means for supporting said amplifier for rotation on a vertical axis, said supporting means permitting oscillation of said amplifier on a horizontal axis, a fixed support, and means mounted thereon and cooperating with said amplifier at a point adjacent its large end for oscillating said amplifier on its horizontal axis to an extent sufficient for the disengagement of the reproducer from a record carried by said support, substantially as described.

This specification signed and witnessed this 5th day of December, 1910.

THOS. A. EDISON.

Witnesses:

DYER SMITH,
ANNA R. KLEHM.

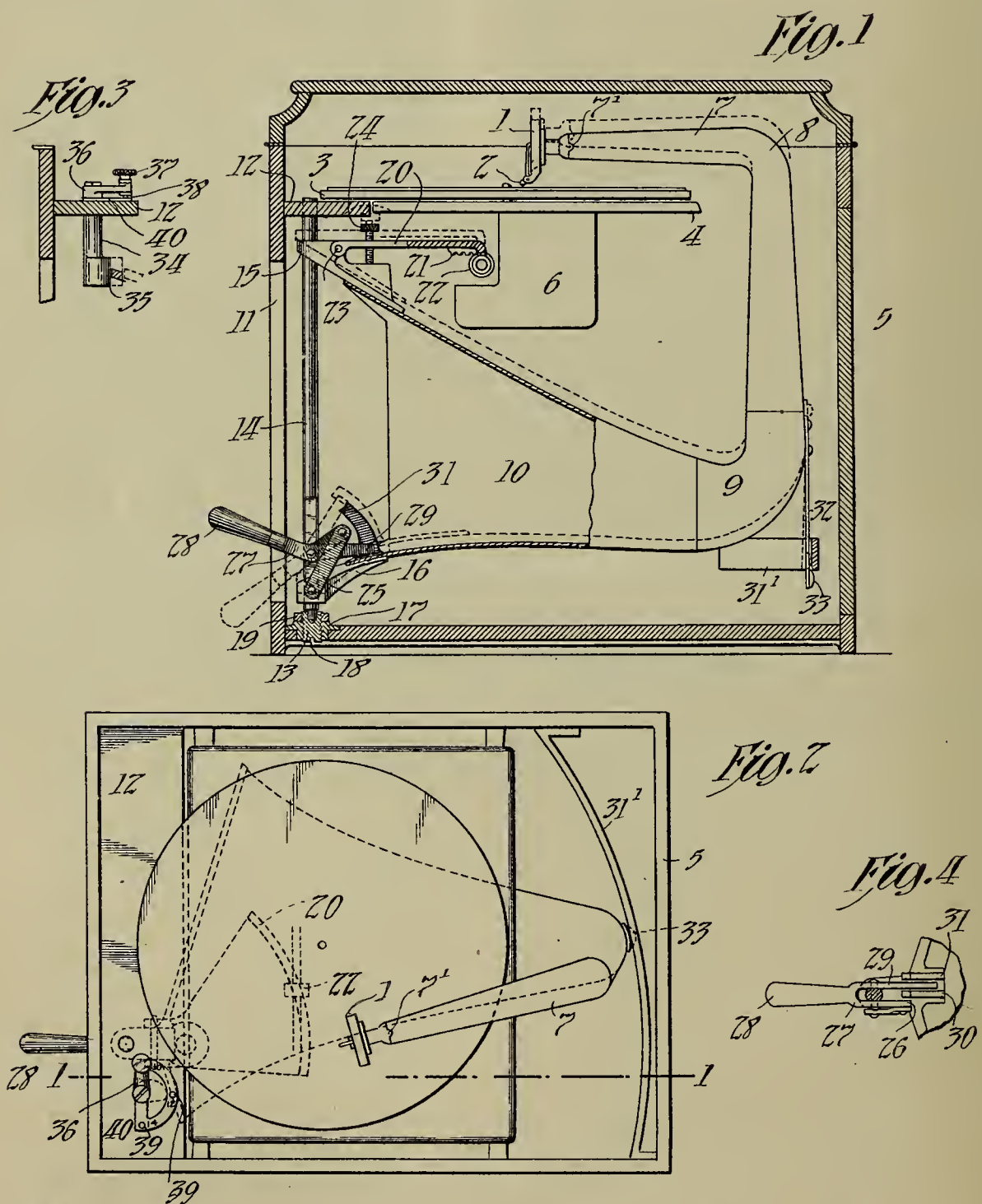
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH OR TALKING MACHINE,
#1,184,333-----T. A. Edison,
Patented-May 23rd, 1916.
Filed-February 17th, 1911.

T. A. EDISON.
 PHONOGRAPH OR TALKING MACHINE.
 APPLICATION FILED FEB. 17, 1911.

1,184,333.

Patented May 23, 1916.



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UNITED STATES PATENT OFFICE.

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PHONOGRAPH OR TALKING-MACHINE.

1,184,333.

Specification of Letters Patent.

Patented May 23, 1916.

Application filed February 17, 1911. Serial No. 609,100.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs or Talking-Machines, of which the following is a description.

My invention relates to phonographs or talking machines particularly of the type in which disk or flat records are operated upon, and preferably in which the sound conveying and amplifying horn is inclosed within a suitable cabinet; and in a general way, my invention resembles that disclosed in my application Serial No. 596,007, filed December 7, 1910, and entitled phonographs or talking machines. In accordance with my invention, the sound reproducer is carried by the sound conveyer, which is connected with the interior of the reproducer, the arm of the sound conveyer to which the reproducer is secured preferably being integral and continuous with the large amplifying horn. The conveyer is pivotally mounted or suspended adjacent the large exit end of the amplifier in such a manner that the conveyer and reproducer oscillate about an axis through the pivotal means referred to during the reproduction of the record, the mounting of the horn or amplifier being preferably such as also to permit a simple manipulation or adjustment of the same to remove the reproducer from operative position when it is desired to change the record. Also, in the preferred embodiment of my invention the lateral movement of oscillation of the sound conveyer and reproducer during the reproduction of a record is obtained by the engagement of mechanical means with co-acting driving means, the said mechanical means being secured to the sound amplifier and so mounted as to cause the desired feeding movement of the latter, this mechanical means and the driving means being disengaged by the adjustment of the sound conveyer which places the reproducer in inoperative position.

The principal object of my invention is to improve the means for placing the reproducer and feed in inoperative position, these means preferably imparting a direct bodily elevation to the conveyer.

Another object of my invention is to provide means whereby the reproducer may be readily brought to a position above the starting point of the record groove, these means preferably being adjustable so as to adapt the same for use with records of different sizes.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more fully understood, attention is hereby directed to the accompanying drawings forming part of this specification, and in which:—

Figure 1 represents a vertical cross-section and a side elevation of a phonograph or talking machine mounted in an inclosing cabinet and embodying one form of my invention; Fig. 2 represents a top plan view thereof, the cover of the casing being removed; Fig. 3 represents a side elevation of my improved stop, the parts of the casing to which the same is connected being shown in section; and Fig. 4 represents a plan view of my improved means for adjusting the sound conveyer, the supporting rod to which same are connected being shown in cross section.

In all of the views corresponding parts are designated by the same reference numerals.

Referring to the drawings, the sound reproducer 1 carries the stylus 2, adapted to reproduce a record carried by the horizontal turntable or record support 3, which is mounted upon the horizontal bed plate 4 within the cabinet 5. A suitable motor for rotating turntable 3 is mounted within a casing 6 supported from bed plate 4. The reproducer is secured to and carried by a horizontal arm 7 of the sound conveyer by a joint 7' permitting a limited up and down and also lateral movement of the reproducer with reference to the arm 7 of the sound conveyer. The arm 7 is rearwardly directed from the reproducer, as shown, to a bend 8, whence it descends vertically past the platform 4 and motor casing 6, being joined by the curved portion 9 to the forwardly directed amplifying exit portion 10 of the horn or conveyer, from the mouth of which the sound reproduced and conveyed is given forth through the opening 11 in the front

side of the cabinet into the atmosphere. The sound conveyer and amplifier extends, as shown, from the joint 7' to its mouth without containing a flexible joint. My invention is not limited to this particular construction, but I consider it preferable.

Rotatably mounted at its respective ends in the bracket or similar support 12 secured to the upper part of the front wall of the cabinet and in the support 13 in the bottom of the cabinet is a vertical rod 14 on which the sound conveyer is arranged to slide vertically while being held against movement about an axis at an angle to the rod. As shown in Figs. 1 and 2, the rod 14 extends through bracket members 15 and 16 secured to and projecting forwardly from the exit portion of the horn. In order to permit vertical adjustment of the rod 14, the support 13 therefor is threaded into the member 17 secured to the bottom of the cabinet and is provided in its lower end with a slot 18 whereby it may be readily rotated. 19 represents a lock nut for securing the support 13 in place.

For feeding the reproducer across the record surface, a sector 20 having gear teeth 21 upon the lower side thereof, as shown, is secured to bracket member 15, the teeth 21 being adapted to engage with a gear 22, preferably a worm, which is rotated by appropriate gearing from the motor contained within the casing 6. The sector 20 is preferably made adjustable with reference to the bracket 15 by securing the same to the said bracket by a horizontal pivot 23 and by mounting therein an adjustable thumb screw 24 adapted to bear on the upper surface of the said bracket.

Pivoted at one end to the bracket 16 is a link 25, which is pivoted at its other end to the inner end of one of the prongs 26 of a forked lever 27. This lever is pivoted intermediate its ends to the rod 14 and extends at its outer end through the opening 11 in the cabinet, being provided at its outer end with a handle 28. The portion of the rod 14 to which the lever 27 is secured is preferably flattened, as shown, and is engaged between the two prongs 26 and 29 of the said lever. As considerable strain would be cast on the pivots of the members 25 and 27 if no other means for preventing relative movement between the rod 14 and the sound conveyer were provided, I have provided the inner surface of the sound conveyer adjacent its exit end with two parallel inwardly projecting segments 30 and 31 adapted to slidably engage between them the prong 29 of the lever 27. It will be seen that the forked end of the lever and the link 25 constitute a toggle by which the horn and the reproducer carried thereby may be readily raised when the handle 28 is lowered. The handle 28, as well as serving to move the horn vertically

or along the axis of rod 14, provides a means for readily moving the same laterally when the teeth 21 are disengaged from the gear 22. It will be seen that when the sound conveyer is in its position corresponding to the engagement of the reproducer with the record surface, the said conveyer will receive all of its support from the pivot means at its mouth.

When the parts of the device are assembled in position, the screw 24 is adjusted until the gear teeth 21 of the sector 20 are in position to engage gear 22. The record having been put in place, the reproducer is let down upon the same, and the parts occupy the position indicated in full lines in Fig. 1. When the machine is operated, gear 22 drives the segment 20 through the teeth 21 to cause the conveyer to swing laterally about the axis of rod 14 and to feed the reproducer across the record surface. In this feeding movement the rod 14 carrying the sound conveyer rotates in its bearings 12 and 13. By reason of the engagement of the prong 29 of the lever 27 with the sound conveyer when the latter is in the position shown in solid lines in Fig. 1, further downward movement of the conveyer is impossible, and the weight of the same is thus carried by the rod 14, the weight of the reproducer alone exerting pressure upon the record through the stylus 2. The gear teeth 21 are held in mesh with the gear 22 by the weight of the sector, the pivotal connection of the sector with the amplifier permitting an easy engagement of the sector with the worm when the stylus 2 is first placed in contact with the record groove of the sound record. When it is desired to disengage the feed and lift the reproducer to disengage the stylus from the record, the sound conveyer may be raised by lifting the horizontal arm 7 of the conveyer, or it may be raised by manipulating the handle 28. When the said handle is depressed from its full line position, shown in Fig. 1, to the dotted line position, the lower end of the link 25 moves vertically upward, thereby elevating the sound conveyer bodily, lifting the reproducer from the record, and disengaging the teeth 21 from the gear 22. The parts may be held in this position and the reproducer moved across the record surface by the handle 28.

In order to resist undesired oscillation of the sound conveyer when the feed is disengaged, frictional means are provided, these means being operative only when the feed is disengaged and preferably comprising an arcuate track 31' and a resilient slide 32, the track 31' being secured to the casing concentrically with the rod 14. The slide 32 comprises a resilient arm secured at its upper end to the vertically extending part of

the sound conveyer and provided at its lower end on the surface opposing the track 31' with a button 33 of friction material. The slide 32 is so located with reference to the track that when the conveyer is in its lowermost position, the button 33 is below the track and the arm 32 is slightly spaced from the track. When the conveyer is raised the button 33 engages the track and the friction between these two members resists lateral pivotal movement of the conveyer.

As records are made of various diameters, commonly 10, 12, and 14 inches, it is desirable to provide some means, preferably adapted for use with any of such records, for readily bringing the reproducer over the starting point of the record groove adjacent the periphery of the record. In Figs. 2 and 3 I have shown an improved adjustable stop designed for this purpose. This stop comprises a vertical rod 34 rotatably mounted in support 12 and provided at its lower end with a cam 35 adjacent the edge of the exit portion of the sound conveyer. A crank 36 secured to the upper end of the rod 34 is provided at its forward end with a thumb piece 37 having in its lower end a pin 38 adapted to resiliently engage any one of the depressions 39 in the plate 40, which is secured to the support 12. By properly adjusting the crank 36, the cam 35 can be brought into such a position relatively to the edge of the exit portion of the sound conveyer, as to limit the outward movement of the conveyer and reproducer when the latter is positioned above the starting point of the record groove.

It is to be understood that I am not limited to the exact details herein shown and described, but—

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. In a phonograph or talking machine, the combination of a record support, a reproducer having a stylus, a sound conveyer carrying said reproducer and having an exit portion extending at an angle to the vertical, said stylus being mounted with sufficient freedom of movement relatively to said conveyer to permit the stylus to accommodate itself to surface irregularities in a record carried by said support, and means comprising a pivot member, said means coacting with said exit portion and constituting the sole support for said conveyer when the stylus is in operative position, and means for moving said conveyer along the axis of said pivot member to remove the stylus from operative position, substantially as described.

2. In a phonograph or talking machine, the combination of a record support, a reproducer having a stylus, a sound conveyer

carrying said reproducer and having an exit portion extending at an angle to the vertical, said stylus being mounted with sufficient freedom of movement relatively to said conveyer to permit said stylus to accommodate itself to surface irregularities in a record carried by said support, means coacting with said exit portion and constituting the sole support for said conveyer when the stylus is in operative position, said means comprising a member along the axis of which said conveyer is movable to remove the stylus from operative position and about the axis of which the conveyer is movable during the reproduction of a record mounted on said record support, and manually operable means coacting with said member for moving said conveyer, substantially as described.

3. In a phonograph or talking machine, the combination of a record support, a reproducer having a stylus, a sound conveyer carrying said reproducer and having an exit portion extending at an angle to the vertical, said stylus being mounted with sufficient freedom of movement relatively to said conveyer to permit said stylus to accommodate itself to surface irregularities in a record carried by said support, supporting means coacting with the exit portion of said conveyer, said conveyer being bodily movable along a line extending at an angle to said record support, but immovable about an axis transverse to said line, and means for moving said conveyer along said line to move said reproducer away from said record support, substantially as described.

4. In a phonograph or talking machine, the combination of a record support, a reproducer having a stylus, a sound conveyer carrying said reproducer and having an exit portion extending at an angle to the vertical, said stylus being mounted with sufficient freedom of movement relatively to said conveyer to permit said stylus to accommodate itself to surface irregularities in a record carried by said support, supporting means coacting with the exit portion of said conveyer, said conveyer being bodily movable along and about a line extending at an angle to said record support, but immovable about an axis transverse to said line, and means for moving said conveyer along said line to move said reproducer away from said record support, substantially as described.

5. In a phonograph or talking machine, the combination of a record support, a reproducer, a movable sound conveyer connected with said reproducer, and manually operable means coacting with the exit portion of said conveyer for moving the conveyer to shift the reproducer across or away from the surface of a record carried by said support, said means comprising a member movable relatively to said conveyer to cause

movement of the latter, substantially as described.

6. In a phonograph or talking machine, the combination of a support, an amplifying sound conveyer pivotally supported thereby and axially movable thereof, a reproducer connected with said conveyer, and manually operable means coacting with said conveyer for oscillating the same about the axis of said support and shifting the same along said axis, said means comprising a member movable relatively to said conveyer to shift the same along said axis, substantially as described.

7. In a phonograph or talking machine, the combination of a record support, a reproducer, a movable sound conveyer connected with said reproducer, and manually operable means coacting with the exit portion of said conveyer and comprising a single controlling member for moving the conveyer to shift the reproducer across or away from the surface of a record carried by said support, said member being pivotally movable relatively to said conveyer to cause said conveyer to move and carry the reproducer away from said record support, substantially as described.

8. In a phonograph or talking machine, the combination of a cabinet, an amplifying sound conveyer within said cabinet, a reproducer carried by said conveyer, said conveyer having a substantially horizontal amplifying exit portion, a vertical rod supported in said cabinet and slidably supporting said horn at the exit portion thereof, and a toggle connected with said rod and conveyer and provided with a handle for shifting said conveyer on said rod to move said reproducer out of operative position, substantially as described.

9. In a phonograph or talking machine, the combination of a support, an amplifying sound conveyer pivotally supported thereby and movable longitudinally thereof, a reproducer carried by said conveyer, and a toggle connected with said conveyer and provided with a handle for manually oscillating said conveyer about the axis of said support or shifting the same longitudinally of said support, substantially as described.

10. In a phonograph or talking machine, the combination of a support, an amplifying sound conveyer pivotally supported thereby and movable longitudinally thereof, the said conveyer being provided with projecting means, a reproducer carried by said conveyer, and a toggle connected with said conveyer and provided with a handle having an extension engaging said projecting means to prevent relative rotation between said toggle and said conveyer substantially as described.

11. In a phonograph or talking machine, the combination of a support an amplifying

sound conveyer movable longitudinally thereof, a reproducer connected with said conveyer, feeding means connected with said conveyer, means adapted to coact with said feeding means to drive the same, said feeding and driving means being connected or disconnected by the movement of said conveyer longitudinally of said support, and means for frictionally resisting lateral movement of said conveyer when said feeding and driving means are disengaged, substantially as described.

12. In a phonograph or talking machine, the combination of a support, an amplifying sound conveyer pivotally supported thereby and movable longitudinally thereof, a reproducer connected with said conveyer, feeding means carried by said conveyer, means adapted to coact with said feeding means to drive the same, said feeding and driving means being disconnected by the movement of said conveyer longitudinally of said support, a fixed friction member, and a second friction member secured to said conveyer and adapted to engage said first named friction member to resist oscillation thereof when said feeding and driving means are disengaged, substantially as described.

13. In a phonograph or talking machine, the combination of a sound conveyer having an amplifying mouth portion, a reproducer connected to said conveyer, means movably supporting said conveyer, an adjustable stop adapted to be engaged by the mouth of said conveyer to limit the movement thereof, and means for adjusting said stop and yieldingly holding the same in adjusted position, substantially as described.

14. In a phonograph or talking machine, the combination of a sound conveyer having an amplifying mouth portion, a reproducer connected to said conveyer, means movably supporting said conveyer, an adjustable stop adapted to be engaged by said conveyer to limit the movement thereof, and means for adjusting said stop and yieldingly holding the same in adjusted position, substantially as described.

15. In a phonograph or talking machine, the combination of a record support, a reproducer, a sound conveyer carrying said reproducer and having an amplifying exit portion extending at an angle to the vertical, pivot means coacting with said conveyer and extending at an angle to said record support said pivot means constituting the sole support for said conveyer when the reproducer is in operative position, and means for moving said conveyer, said moving means comprising a member pivotally movable relatively to said conveyer and pivot means to shift said conveyer along the axis of said pivot means, substantially as described.

16. In a phonograph or talking machine, the combination of a record support, a reproducer, a sound conveyer carrying said reproducer and having an amplifying exit portion, pivot means coacting with said conveyer and constituting the sole support for said conveyer when the reproducer is in operative position, and unitary means for moving said conveyer and reproducer along the axis of said pivot means and in an arcuate path about said axis substantially as described.

17. In a phonograph or talking machine, the combination of a record support, a reproducer having a stylus, a sound conveyer carrying said reproducer, said stylus being mounted with sufficient freedom of movement relatively to said conveyer to permit said stylus to accommodate itself to surface irregularities in a record carried by said support, pivot means coacting with said conveyer and constituting the sole support therefor when the stylus is in operative position, means for shifting said conveyer along the axis of said first means for moving said stylus away from the surface of the record, and feeding means for moving said conveyer about said axis, said feeding means being automatically rendered inoperative by the shifting of the conveyer to move the stylus away from the record surface, substantially as described.

18. In a phonograph or talking machine, the combination of a record support, a reproducer, a sound conveyer carrying said reproducer and having an amplifying exit portion directed at an angle to the vertical, said stylus being mounted with sufficient freedom of movement relatively to said conveyer to permit said stylus to accommodate itself to surface irregularities in a record carried by said support, pivot means constituting the sole support for said conveyer, said means comprising a member along the axis of which the said conveyer is shiftable to move said stylus out of operative position, and feeding means comprising a member carried by said conveyer for moving said conveyer about said axis, said means being automatically rendered inoperative by the shifting of the conveyer to move the stylus out of operative position, substantially as described.

19. In a phonograph or talking machine, the combination of a record support, a reproducer, a sound conveyer carrying said reproducer and having an amplifying exit portion directed at an angle to the vertical, pivot means constituting the sole support for said conveyer, said means comprising a rod coacting with opposite sides of said conveyer, means for shifting said conveyer along the axis of said rod to move said reproducer out of operative position, and feed-

ing means comprising a member carried by said conveyer for moving said conveyer about said axis, said feeding means being automatically rendered operative or inoperative by the shifting of the conveyer to move the reproducer into or out of operative position, substantially as described.

20. In a phonograph or talking machine, the combination of a record support, a reproducer, a sound conveyer carrying said reproducer and having an amplifying exit portion directed at an angle to the vertical, pivot means constituting the sole support for said conveyer, said means comprising a rod coacting with opposite sides of said exit portion and constituting the sole support for said conveyer, means for shifting said conveyer along said rod to move said reproducer out of operative position, and feeding means comprising a member carried by said conveyer for moving said conveyer about said axis, said means being automatically rendered inoperative by the shifting of the conveyer to move the reproducer out of operative position, substantially as described.

21. In a phonograph or talking machine, the combination of a support, an amplifying sound conveyer mounted thereon and movable longitudinally of the axis thereof, and means yieldingly resisting lateral movement of said conveyer when the latter is in a given position longitudinally of said axis but permitting free lateral movement of the conveyer when the latter is in a different position longitudinally of said axis, substantially as described.

22. In a phonograph or talking machine, the combination of a support, an amplifying sound conveyer mounted thereon and movable longitudinally of the axis thereof, and means frictionally resisting lateral movement of said conveyer when the latter is in a given position longitudinally of said axis but permitting free lateral movement of the conveyer when the latter is in a different position longitudinally of said axis, substantially as described.

23. In a phonograph or talking machine, the combination of a support, an amplifying sound conveyer pivotally supported thereby and movable longitudinally of the axis thereof, and means yieldingly resisting lateral movement of said conveyer when the latter is in a given position longitudinally of said axis but permitting free lateral movement of the conveyer when the latter is in a different position longitudinally of said axis, substantially as described.

24. In a phonograph or talking machine, the combination of a support, an amplifying sound conveyer pivotally supported thereby and movable longitudinally of the axis thereof, and means frictionally resisting lateral movement of said conveyer when

the latter is in a given position longitudinally of said axis but permitting free lateral movement of the conveyer when the latter is in a different position longitudinally of said axis, substantially as described.

25. In a phonograph or talking machine, the combination of a cabinet having an opening therein, a record support, a reproducer in proximity to said support, a sound conveyer connected with said reproducer and having its mouth within said cabinet opposite said opening, supporting means for said sound conveyer, and means projecting through said opening for shifting said conveyer along the axis of said supporting means to move said reproducer away from the surface of a record carried by said record support, substantially as described.

26. In a phonograph or talking machine, the combination of a cabinet having an opening therein, a record support, a reproducer in proximity to said support, a sound conveyer connected with said reproducer on one side of said support and having its mouth on the other side of said support, within said cabinet and opposite said opening, and pivot means coacting with said conveyer and constituting the sole support therefor when the reproducer is in operative position, said conveyer being shiftable along the axis of said pivot means for moving said reproducer toward or away from the surface of a record carried by said record support, substantially as described.

27. In a phonograph or talking machine, the combination of a cabinet having an opening therein, a record support, a reproducer in proximity to said support, a sound conveyer connected to said reproducer on one side of said support and extending without flexible joint from a point in proximity to said reproducer to a point within said cabinet opposite said opening and on the other side of said support, and pivot means coacting with said conveyer and constituting the sole support therefor when the reproducer is in operative position, said conveyer being shiftable along the axis of said pivot means for moving said reproducer toward or away from the surface of a record carried by said record support, substantially as described.

28. In a phonograph or talking machine, the combination of a cabinet having an opening therein, a record support, a reproducer in proximity to said support, a sound conveyer carrying said reproducer and having its mouth within said cabinet opposite said opening, and pivot means coacting with the exit portion of said conveyer and having its axis a substantial distance from said reproducer, said pivot means constituting the sole support for said conveyer when the reproducer is in operative position, and means coacting with said pivot means and said

conveyer for shifting said conveyer along the axis of said pivot means to move said reproducer away from the surface of a record carried by said support, substantially as described.

29. In a phonograph or talking machine, the combination of a cabinet having an opening therein, a record support, a reproducer in proximity to said support, a sound conveyer connected with said reproducer on one side of said support and having its mouth on the other side of said support, within said cabinet and opposite said opening, and pivot means coacting with the exit portion of said conveyer and having its axis a substantial distance from said reproducer, said pivot means constituting the sole support for said conveyer when the reproducer is in operative position, and said conveyer being shiftable along the axis of said pivot means for moving said reproducer toward or away from the surface of a record carried by said record support, substantially as described.

30. In a phonograph or talking machine, the combination of a cabinet having an opening therein, a record support, a reproducer in proximity to said support, a sound conveyer connected to said reproducer on one side of said support and extending without flexible joint from a point in proximity to said reproducer to a point within said cabinet opposite said opening and on the other side of said support, and pivot means coacting with the exit portion of said conveyer and having its axis a substantial distance from said reproducer, said pivot means constituting the sole support for said conveyer when the reproducer is in operative position, and said conveyer being shiftable along the axis of said pivot means for moving said reproducer toward or away from the surface of a record carried by said record support, substantially as described.

31. In a phonograph or talking machine, the combination of a record support, a reproducer having a stylus, a sound conveyer carrying said reproducer and having an exit portion extending at an angle to the vertical, said stylus being mounted with sufficient freedom of movement relatively to said conveyer to permit said stylus to accommodate itself to surface irregularities in a record carried by said support, supporting means coacting with the exit portion of said conveyer, said conveyer being bodily movable along a line extending at an angle to said record support but immovable about an axis transverse to said line, and means coacting with said supporting means for moving said conveyer along said line to move said stylus away from said record support, substantially as described.

32. In a phonograph or talking machine, the combination of a record support, a re-

producer above said support, a sound conveyer carrying said reproducer and extending downwardly and then forwardly under said record support, and a pivotal mounting
 5 for said conveyer sufficiently in advance of said reproducer to permit the reproducer to travel across a record carried by said support, said conveyer being capable of rectilinear movement to permit said reproducer
 10 to be engaged with or disengaged from the record, substantially as described.

33. In a phonograph or talking machine, the combination of a record support, a reproducer above said support, a sound conveyer carrying said reproducer and extending
 15 downwardly and then forwardly under said record support, a pivotal mounting for said conveyer sufficiently in advance of said reproducer to permit the reproducer to travel across a record carried by said support, said conveyer being capable of rectilinear movement to permit said reproducer
 20 to be engaged with or disengaged from the record, and feeding means for effecting the pivotal movement of the conveyer, substantially as described.

34. In a phonograph or talking machine, the combination of a record support, a reproducer above said support, a sound conveyer carrying said reproducer and extending
 30 downwardly and then forwardly under said record support, the said conveyer being mounted for pivotal movement about an axis sufficiently in advance of said reproducer to permit said reproducer to travel across a record carried by said support and also for rectilinear movement to permit
 35 said reproducer to be engaged with or disengaged from the record, and means for effecting the rectilinear movement of said conveyer, substantially as described.

35. In a phonograph or talking machine, the combination of a record support, a reproducer above said support, a sound conveyer carrying said reproducer and extending
 45 downwardly and then forwardly under said record support, the said conveyer being mounted for pivotal movement about an axis sufficiently in advance of said reproducer to permit said reproducer to travel across a record carried by said support and also for rectilinear movement to permit said
 50 reproducer to be engaged with or disengaged from the record, and manually operable means for moving said conveyer about said axis, substantially as described.

36. In a phonograph or talking machine, the combination of a record support, a reproducer above said support, a sound conveyer carrying said reproducer and extending
 60 downwardly and then forwardly under said record support, the said conveyer being mounted for pivotal movement about an axis sufficiently in advance of said reproducer to permit said reproducer to travel

across a record carried by said support and also for rectilinear movement to permit said reproducer to be engaged with or disengaged from the record, and unitary means
 70 for effecting the aforesaid pivotal and rectilinear movements of said conveyer, substantially as described.

37. In a phonograph or talking machine, the combination of a record support, a reproducer above said support, a sound conveyer carrying said reproducer and extending
 75 downwardly and then forwardly under said record support, the said conveyer being mounted for pivotal movement about an axis sufficiently in advance of said reproducer to permit said reproducer to travel across a record carried by said support and also for rectilinear movement to permit said
 80 reproducer to be engaged with or disengaged from the record, feeding means for effecting the pivotal movement of said conveyer, and unitary means for shifting said conveyer to disengage said reproducer from the record and for rendering said feeding
 85 means inoperative, substantially as described.

38. In a phonograph or talking machine, the combination of a record support, a reproducer, a sound conveyer carrying said reproducer and extending downwardly and
 95 then forwardly under said record support, said conveyer being bodily movable along a line extending at an angle to said record support but immovable about an axis transverse to said line, and means for moving
 100 said conveyer along said line to move said reproducer away from said record support, substantially as described.

39. In a phonograph or talking machine, the combination of a record support, a cabinet, a reproducer, a sound conveyer carrying said reproducer and extending downwardly
 105 and then forwardly under said record support within said cabinet, supporting means for said conveyer permitting bodily movement thereof along a line extending at an angle to said record support while preventing movement thereof about an axis
 110 transverse to said line, and means coacting with said supporting means for moving said conveyer along said line to move said reproducer away from said record support, substantially as described.

40. In a phonograph or talking machine, the combination of a record support, a reproducer, a cabinet, a sound conveyer carrying said reproducer and extending downwardly past said record support and then
 120 forwardly under the same within said cabinet, pivot means supporting said conveyer, said means comprising a rod coacting with opposite sides of said conveyer to prevent movement of the latter about an axis
 125 at an angle to said rod, and means for shifting said conveyer along the axis of

said rod to move said reproducer out of operative position with respect to said record support, substantially as described.

41. In a phonograph or talking machine, the combination of a record support, a reproducer, a cabinet, a sound conveyer carrying said reproducer and extending downwardly past said record support and then forwardly under the same within said cabinet, pivot means supporting said conveyer, said means comprising a rod coacting with opposite sides of said conveyer to prevent movement of the latter about an axis at an

angle to said rod, means for shifting said conveyer along the axis of said rod to move said reproducer out of operative position with respect to said record support, and means for adjusting the said rod axially, substantially as described. 15

This specification signed and witnessed this 15th day of February 1911. 20

THOS. A. EDISON.

Witnesses:

FREDERICK BACHMANN,
ANNA R. KLEHM.

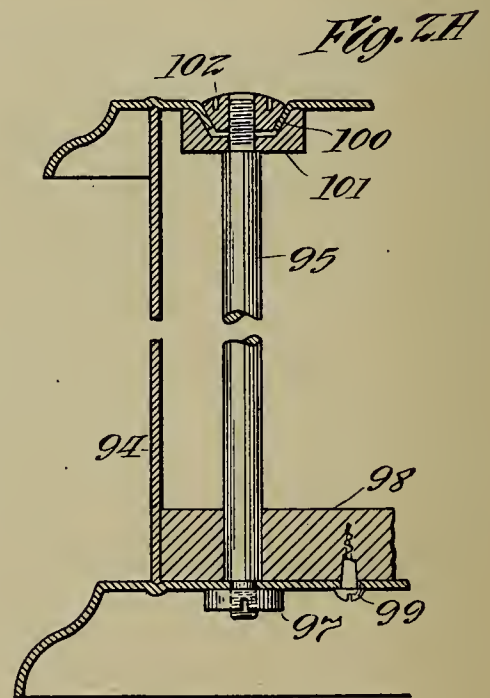
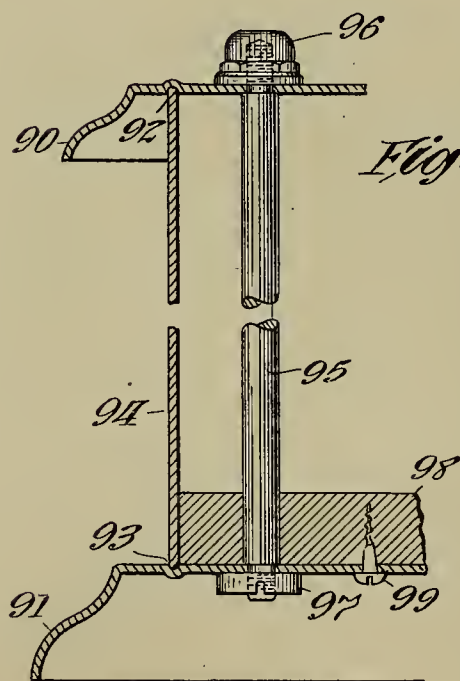
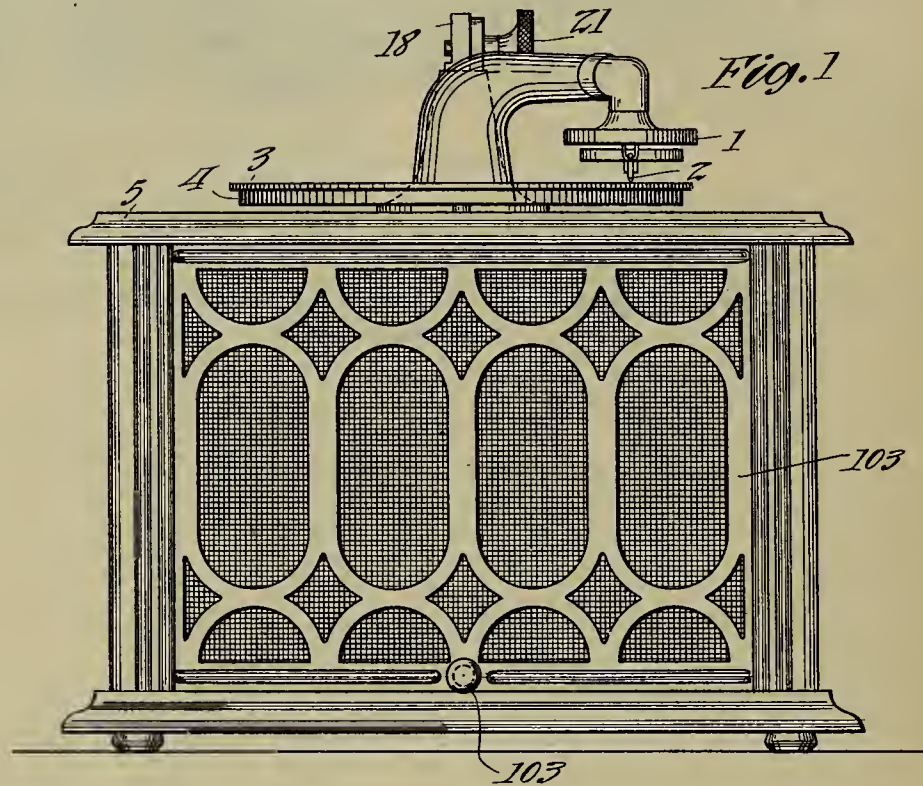
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH OR TALKING MACHINE,
1,184,334-----Thomas A. Edison,
Patented-May 23rd, 1916.
Filed-August 12th, 1912.

T. A. EDISON.
 PHONOGRAPH OR TALKING MACHINE.
 APPLICATION FILED AUG. 12, 1912.

1,184,334.

Patented May 23, 1916.
 5 SHEETS—SHEET 1.



Witnesses:
 C. E. Brown
 Frederick Bachmann.

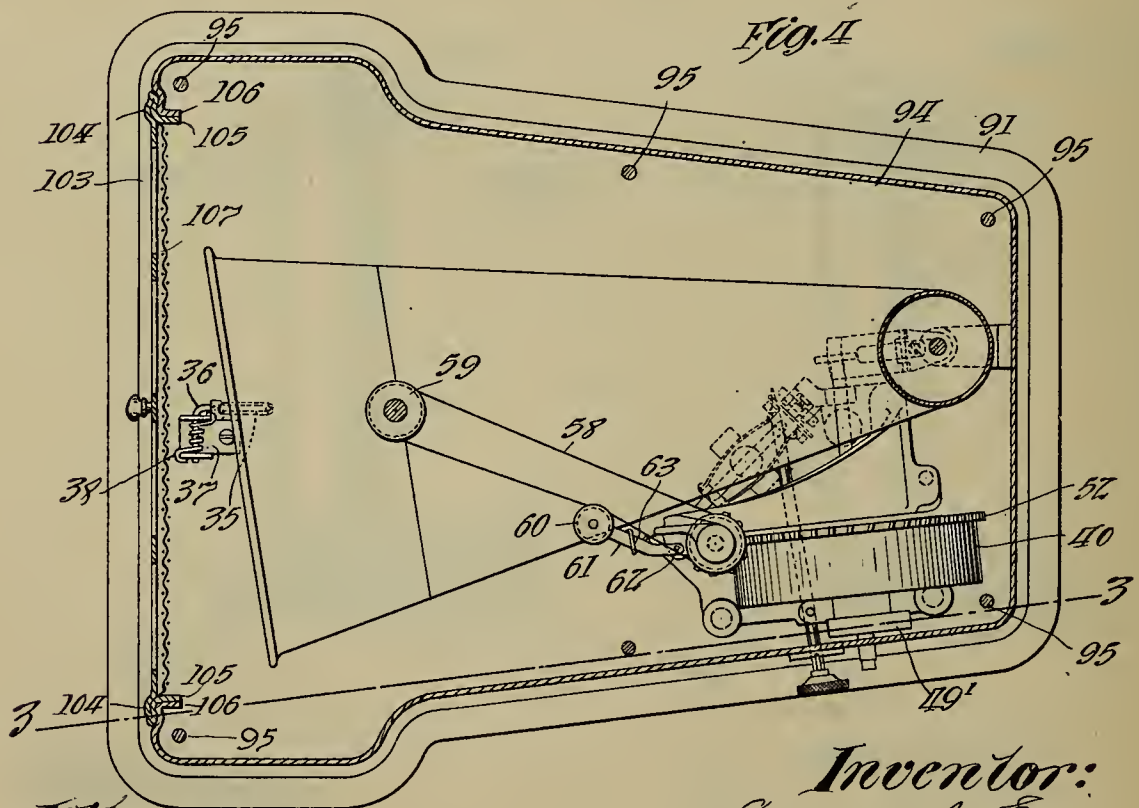
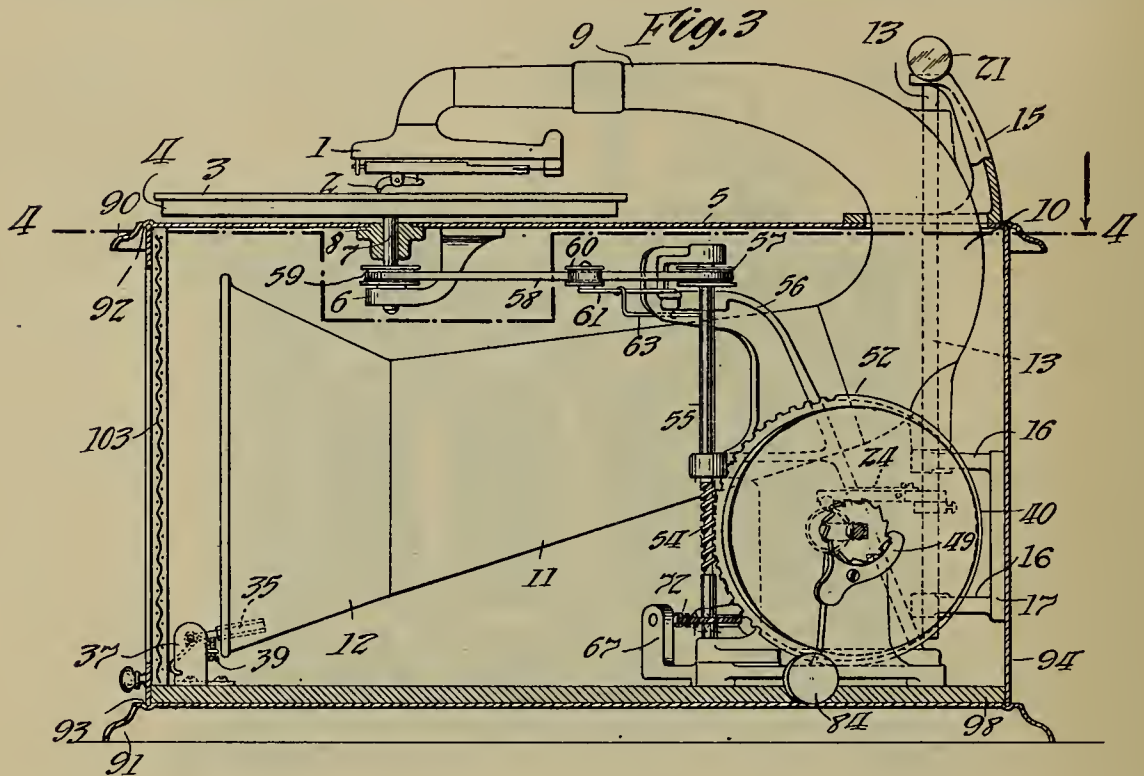
Inventor:
 Thomas A. Edison
 by Frank R. L. Dyer
 his Atty.



T. A. EDISON.
 PHONOGRAPH OR TALKING MACHINE.
 APPLICATION FILED AUG. 12, 1912.

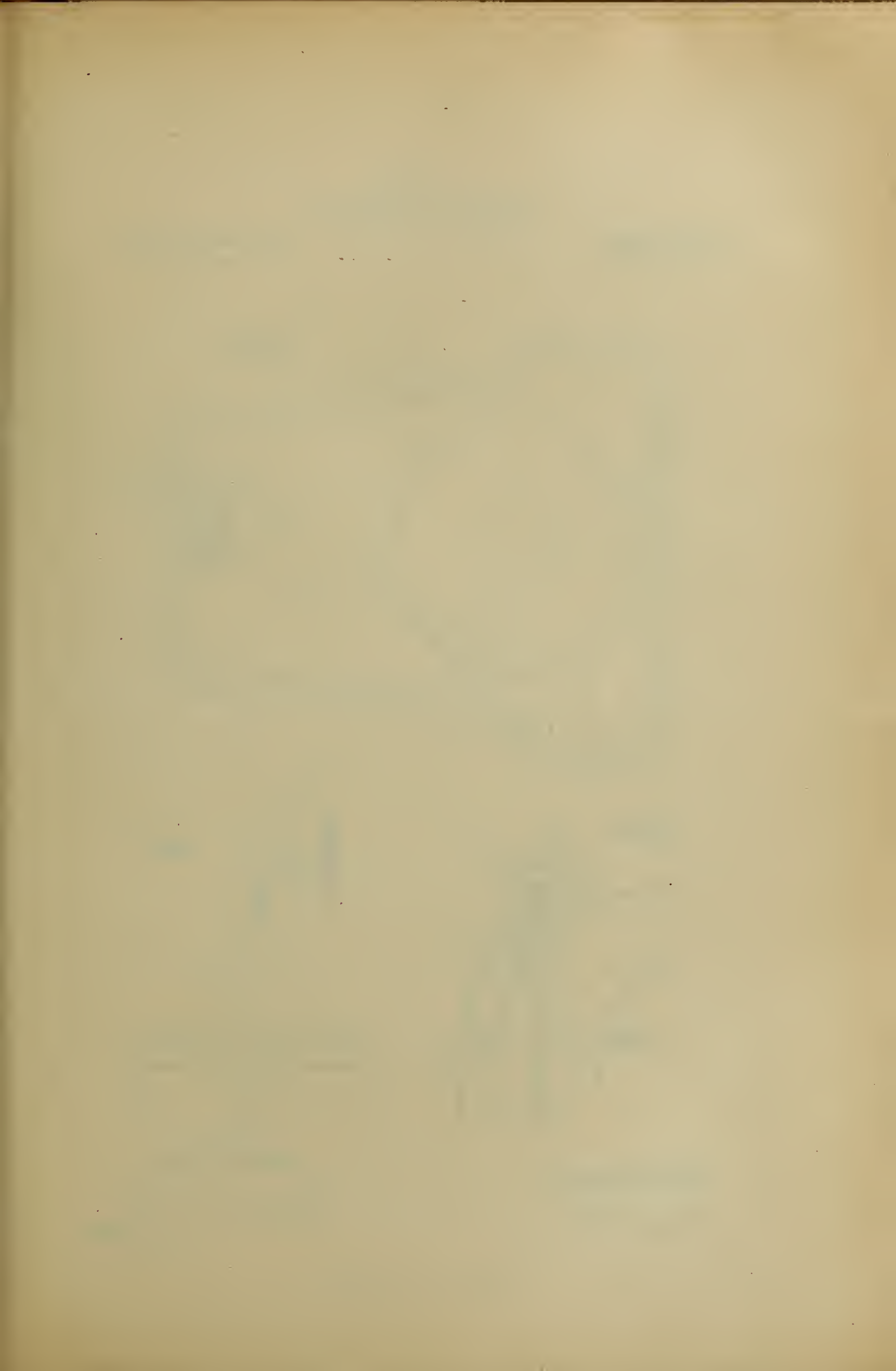
1,184,334.

Patented May 23, 1916.
 5 SHEETS—SHEET 2.



Witnesses:
 Frank Lewis
 Frederick Bachmann.

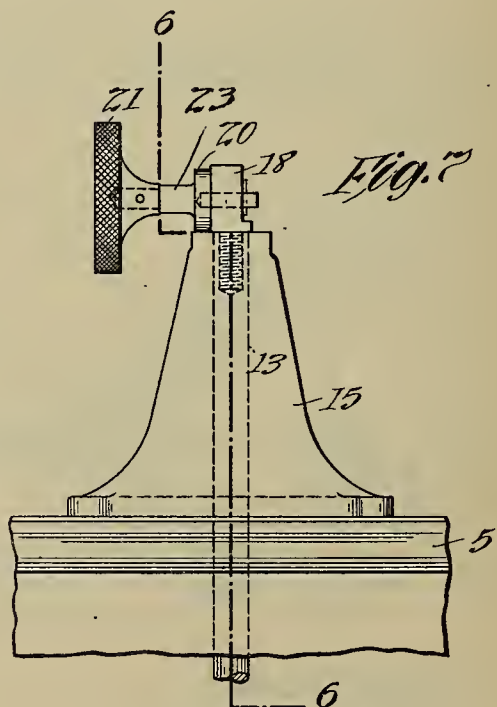
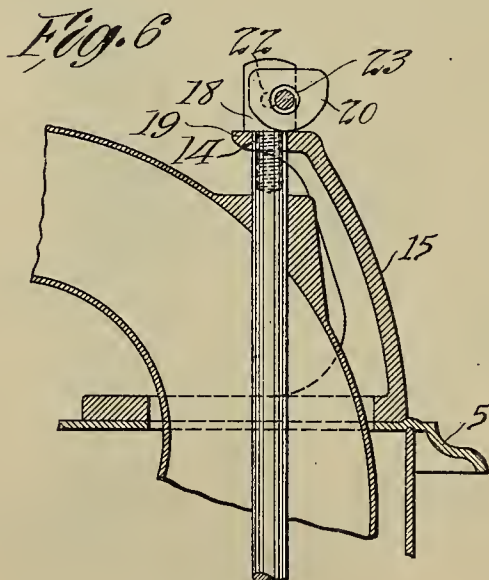
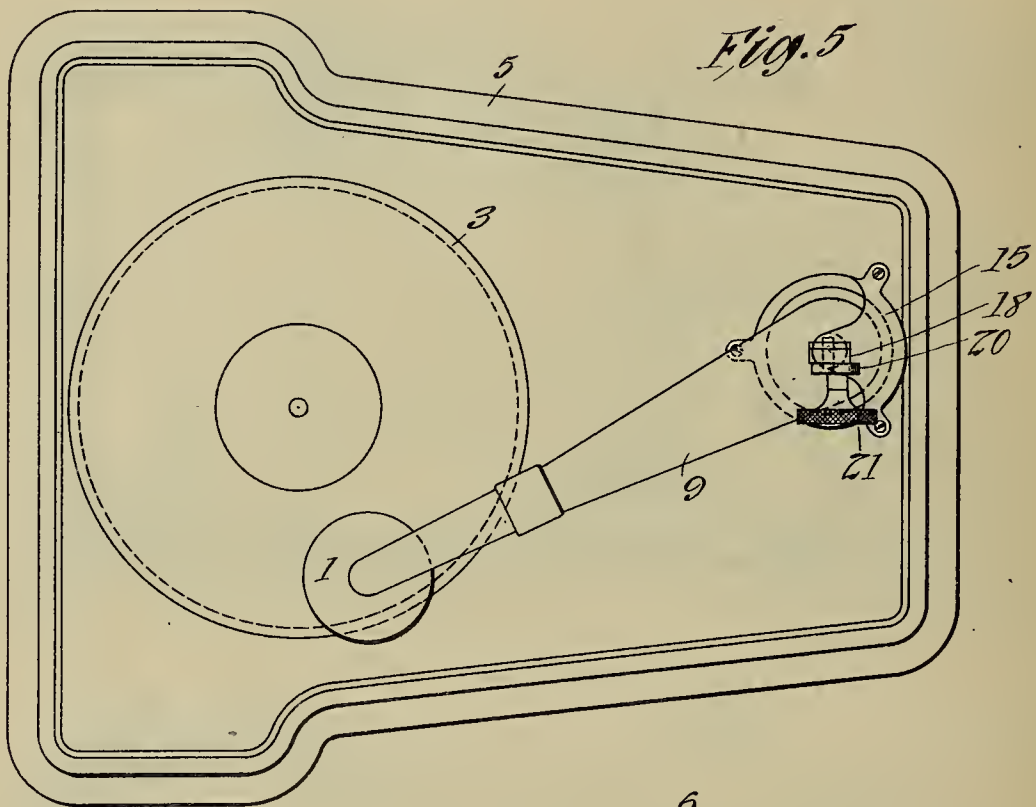
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 his Atty.



T. A. EDISON.
 PHONOGRAPH OR TALKING MACHINE.
 APPLICATION FILED AUG. 12, 1912.

1,184,334.

Patented May 23, 1916.
 5 SHEETS—SHEET 3.

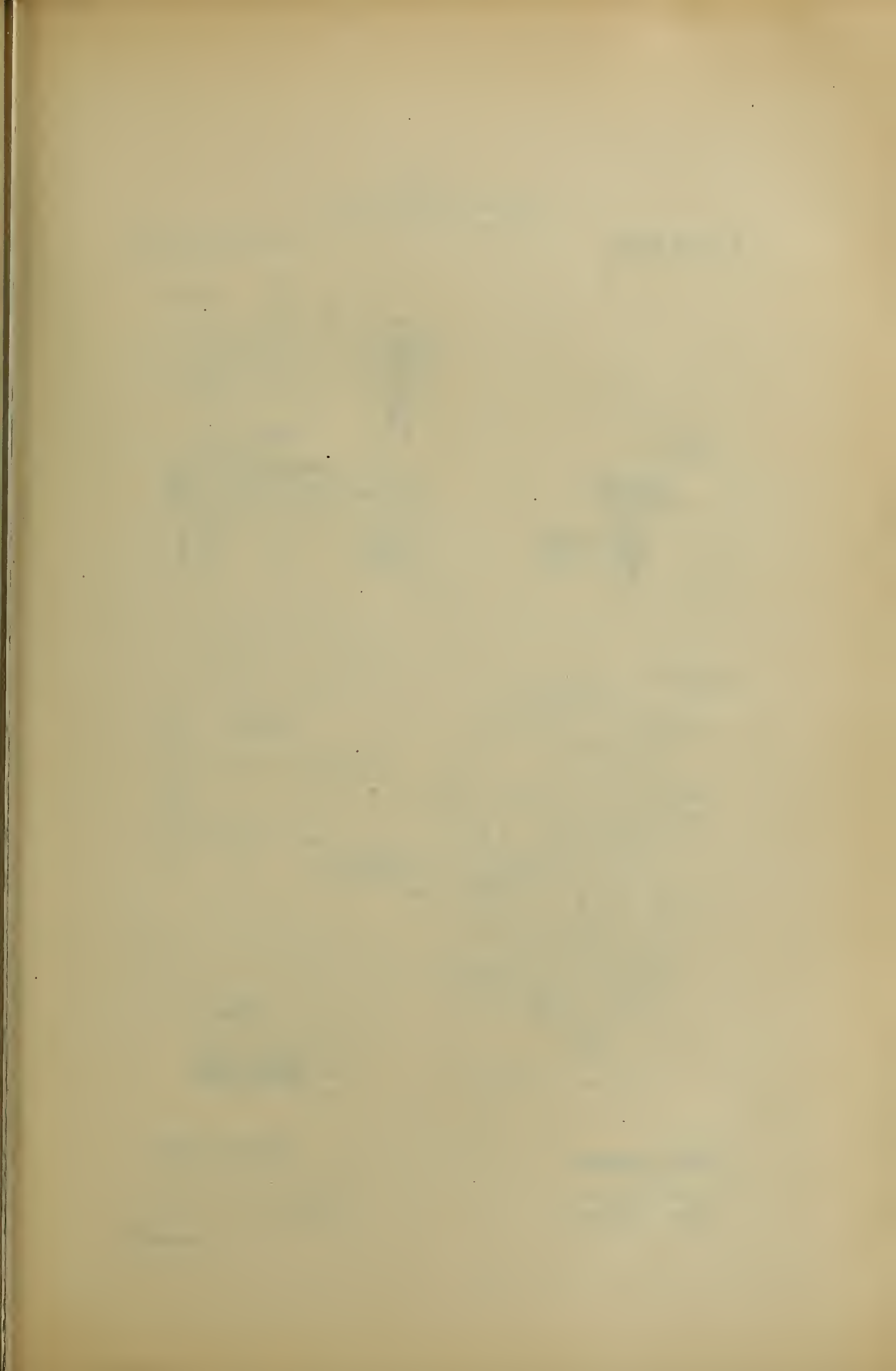


Witnesses:

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his Atty.



T. A. EDISON.
 PHONOGRAPH OR TALKING MACHINE.
 APPLICATION FILED AUG. 12, 1912.

1,184,334.

Patented May 23, 1916.

5 SHEETS—SHEET 4.

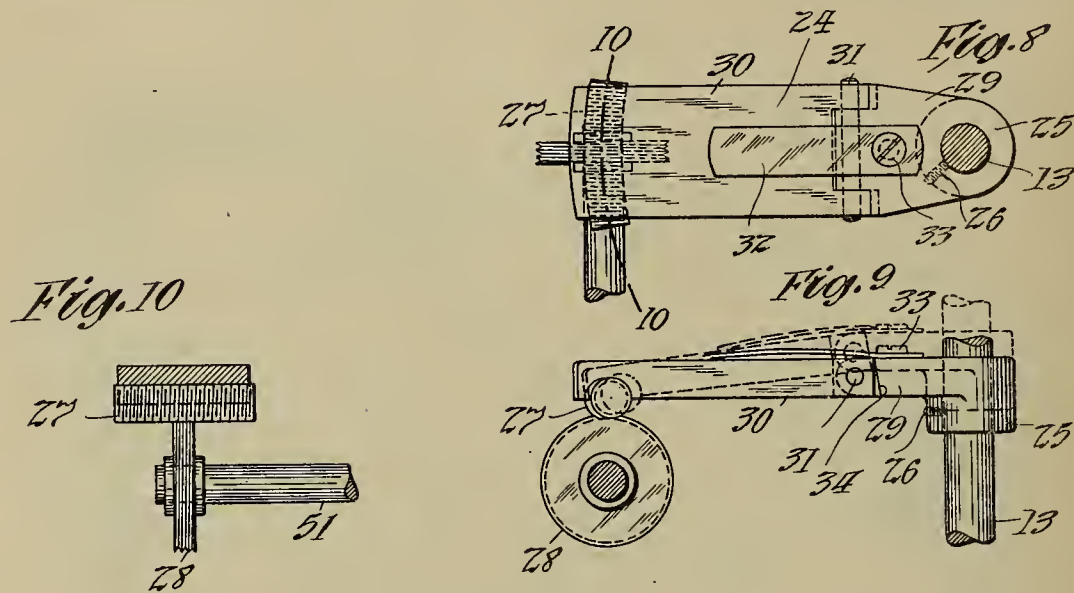


Fig. 10

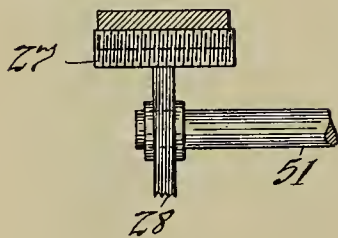


Fig. 12

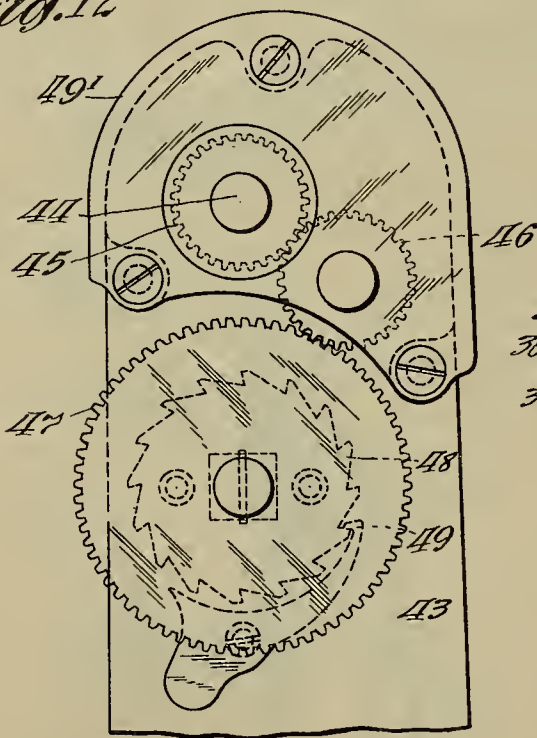


Fig. 11

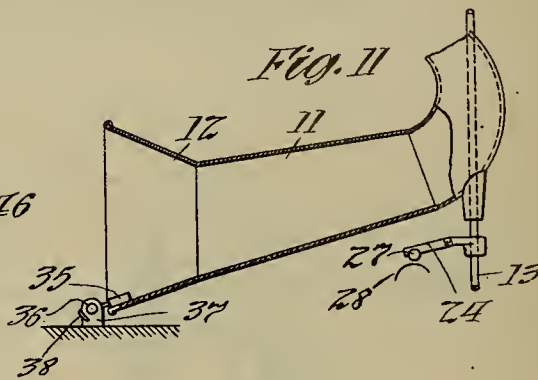
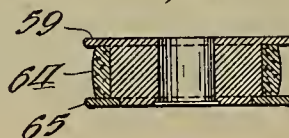


Fig. 13

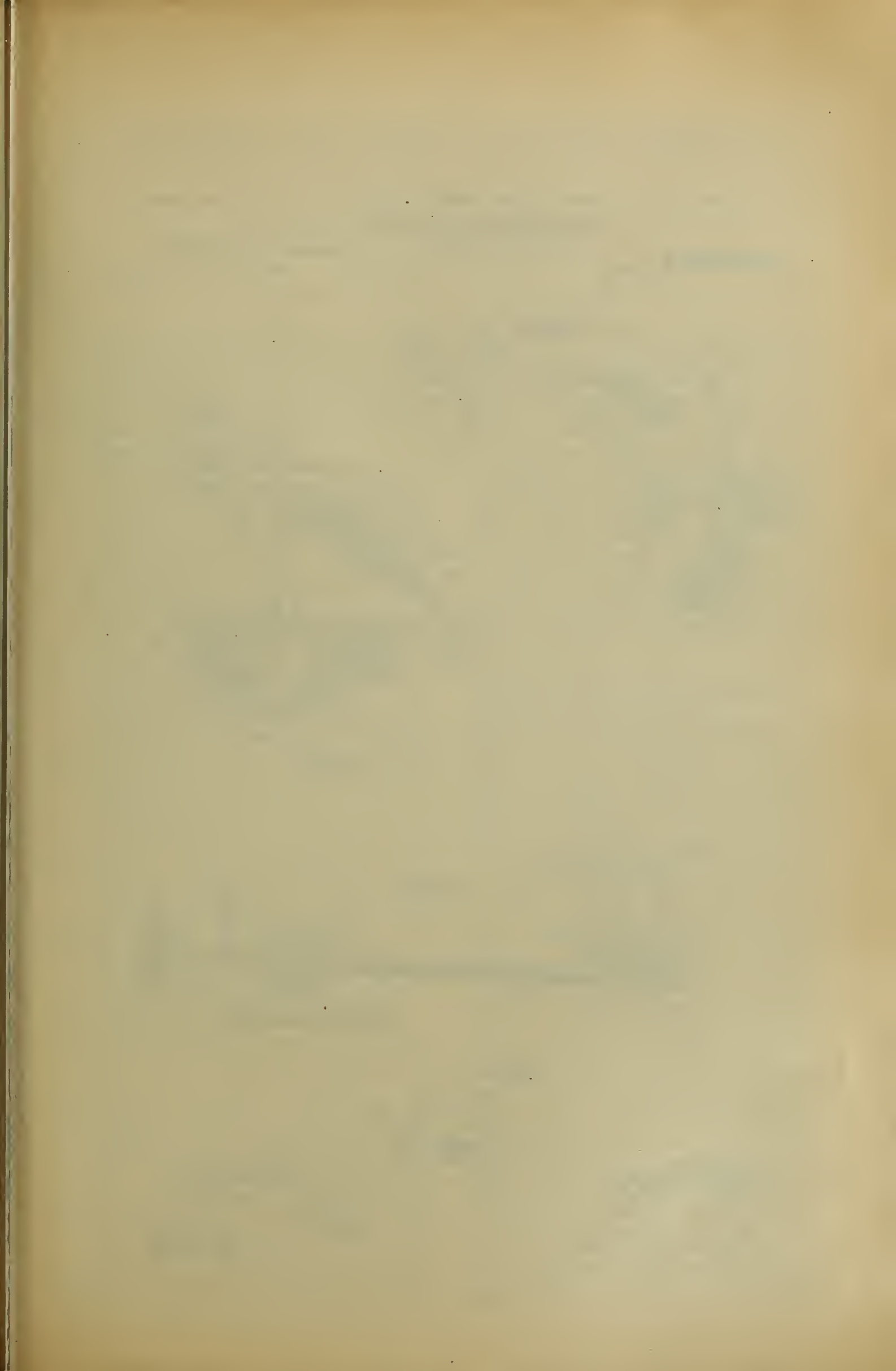


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T. A. EDISON.
 PHONOGRAPH OR TALKING MACHINE.
 APPLICATION FILED AUG. 12, 1912.

1,184,334.

Patented May 23, 1916.

5 SHEETS—SHEET 5.

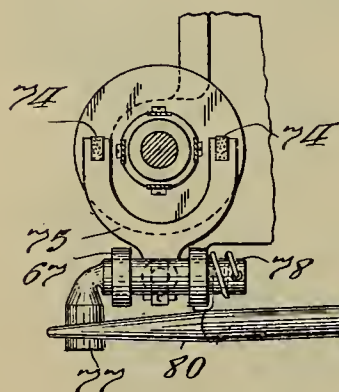
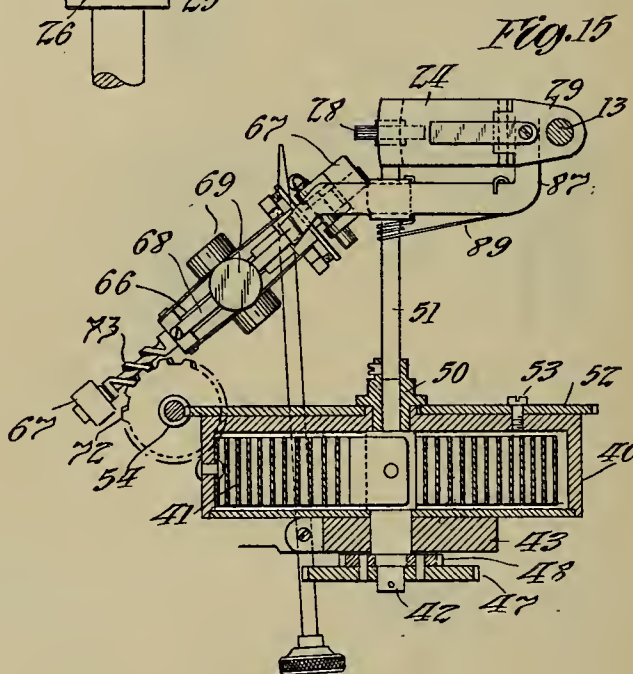
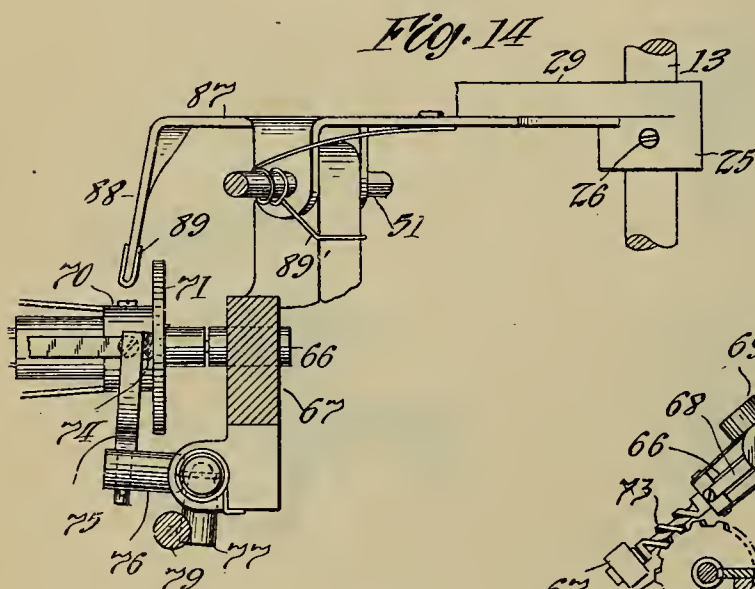


Fig. 16

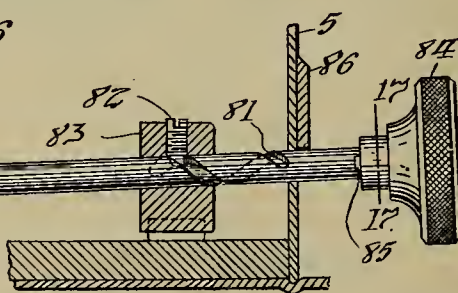
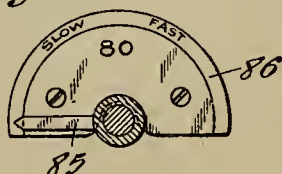


Fig. 17



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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY.

PHONOGRAPH OR TALKING-MACHINE.

1,184,334.

Specification of Letters Patent.

Patented May 23, 1916.

Application filed August 12, 1912. Serial No. 714,561.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, Essex county, New Jersey, have invented certain new and useful Improvements in Phonographs or Talking-Machines, of which the following is a description.

My invention relates to phonographs or talking machines, particularly of the type in which disk or flat records are operated upon and preferably in which the sound conveying and amplifying horn is inclosed within a suitable cabinet, my present invention resembling in some respects that disclosed in my application Serial No. 609,100, filed February 17, 1911.

The principal object of my invention is to provide a machine of the type above referred to, which may be constructed in a compact and inexpensive form.

Another object of my invention is to provide means for rotating the record support and feeding the reproducer across the record surface, and means whereby the said first named means are rendered inoperative when the reproducer is disengaged from the record surface.

A further object of my invention is to provide a metallic talking machine cabinet adapted to support the talking machine motor and of such a construction that the vibrations of the motor will not be imparted to the cabinet, unpleasant foreign sounds, such as would be produced by the vibration of the cabinet being thereby avoided.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more fully understood, attention is hereby directed to the accompanying drawings forming a part of this specification and in which:

Figure 1 represents a front elevation of a phonograph or talking machine embodying one form of my invention; Fig. 2 represents a vertical sectional view illustrating a detail of construction of my improved cabinet; Fig. 2^A represents a sectional view illustrating a modification of the feature of my invention disclosed in Fig. 2; Fig. 3 represents a view of the phonograph or talking machine of Fig. 1, partly in elevation and partly in vertical section taken on the line 3—3 of Fig. 4; Fig. 4 represents a sec-

tional view thereof taken on the line 4—4 of Fig. 3; Fig. 5 represents a top plan view thereof; Fig. 6 represents a vertical sectional view on the line 6—6 of Fig. 7 and illustrating the upper part of the mounting of the sound conveyer; Fig. 7 represents an elevation of the parts shown in Fig. 6 taken from a point to the right of Fig. 6; Figs. 8 and 9 represent a plan view and side elevation respectively of details of the apparatus employed for feeding the sound conveyer laterally; Fig. 10 represents a sectional view taken on the line 10—10 of Fig. 8; Figs. 11 to 17 inclusive represent views of details of construction, Fig. 12 being in elevation, Fig. 13 in central cross section, and Figs. 11, 14, 15, 16 and 17 being partly in section and partly in elevation, the section shown in Fig. 17 being taken on the line 17—17 of Fig. 16.

In all of the views, like parts are designated by the same reference numerals.

Referring to the drawings, the sound reproducer 1 carries stylus 2 adapted to reproduce a record 3 carried by the rotatable turntable or record support 4 which is mounted on the top of the cabinet 5. The reproducer shown is of the type described in my U. S. Patent No. 1,055,621, in which the stylus is carried by a lever pivotally mounted on a floating weight, this construction providing sufficient freedom of movement of the stylus to permit the latter to accommodate itself to surface irregularities in the record. The mounting for the turntable comprises a bracket 6 mounted upon the lower side of the top of the cabinet and rotatably supporting the spindle 7 passing through the bushing 8 in the top of the cabinet and secured at its upper end to the turntable 4. The reproducer is carried by the arm 9 of the sound conveyer, which arm extends rearwardly from the reproducer, thence downwardly through an opening in the top of the cabinet, as shown at 10, and thence forwardly, as shown at 11, the forwardly directed portion of the sound conveyer terminating in a forwardly directed amplifying exit portion 12. The opening in the top of the cabinet, as shown, is materially larger than the cross section of the sound conveyer at the point where the latter passes through the said opening. The sound conveyer is preferably formed continuous, or without flexible joint, and the taper thereof increases from the small end to the exit

thereof; so that a very pure and efficient amplification of the sound waves from the reproducer is obtained.

The conveyer is pivotally supported by a rod 13 extending through the portion 10 of the sound conveyer and preferably secured thereto as by solder, the rod 13 extending rotatably and slidably through an opening 14 in a bracket 15 mounted upon the top of the talking machine cabinet and through vertically alined openings in lugs or projections 16 upon the bracket 17 secured within the talking machine cabinet to the rear wall thereof. The upper end of the rod 13 is provided with an enlargement 18 engaging the top of the horizontal projection 19 on the bracket 15 to limit the downward movement of the rod 13 and the sound conveyer. To facilitate the raising and lowering of the rod 13 and the sound conveyer and reproducer, I provide a cam 20 pivoted to the enlargement 18, this cam having secured thereto a knurled head 21 by which it may be readily rotated.

Referring particularly to Fig. 6, it will be noted that the axis of the pivot 22 by which the cam 20 is connected to the enlargement 18 is located a substantial distance to the left of the axis of the stem 23 whereby the knurled head 21 is connected to the cam 20. By reason of this construction, the upward movement of the sound conveyer upon the rotation of the knurled head 21 is equal to the sum of the upward movement caused by the cam action of the member 20 upon the bracket arm 14 and that caused by the eccentricity of the axis of the member 22 with respect to the axis of the member 23, so that a considerable vertical movement of the conveyer is obtained.

For moving the sound conveyer laterally and feeding the reproducer across the record surface, I provide a rack or sector 24 having a hub-like portion 25 (see Figs. 8 and 9) whereby it is secured to the rod 13, as by a screw 26, and having also a toothed portion 27 adapted to engage with a gear 28 driven from the talking machine motor, as will hereinafter be explained. The rack or sector is preferably formed of two sections, one section 29 secured to the rod 13 and a second section 30 connected to the section 29 by a pivot 31, the axis of which pivot extends substantially parallel to the central axis of the gear 28. A spring 32 secured to the section 29, as by the screw 33, bears upon the section 30 to press the same downwardly and to normally hold the same in engagement with the gear 28, a shoulder 34 on the section 29 serving by its engagement with the pivoted end of the section 30 to limit the downward movement of the latter. For a reason which will appear more fully hereinafter, the teeth on the member 27 are curved transversely to the length thereof and to the

axis of the member 28, the member 27 being preferably a worm soldered into a recess in the section 30. As the rack or sector oscillates about the axis of the rod 13, the axis of the worm 27 should be curved on an arc of a circle about the axis of the rod 13 as a center, as shown. In order to resist undesired lateral oscillation of the conveyer and reproducer whenever the member 27 is disengaged from the driving gear 28, means, such as the friction shoe 35 (see Figs. 3, 4, and 11) bearing slidably on the inner surface of the exit end of the sound conveyer, is provided, such means yielding sufficiently to permit the manual oscillation of the sound conveyer about the axis of the rod 13. The friction shoe 35, which may be a short section of rubber tubing, is mounted on the end of a right angular rod 36, the side of the said rod opposite that carrying the shoe 35 being pivotally mounted in a bearing 37 mounted in the bottom of the phonograph cabinet. A spring 38 serves to rotate the rod 36 to press the shoe into engagement with the sound conveyer, the downward movement of the shoe 35 being limited by a screw 39 (see Fig. 3) threaded into the bracket 37 and engaging the under side of the rod 36.

In the operation of the invention, the record 3 is placed upon the record support when the sound conveyer and the reproducer carried thereby are in elevated position. In this position of the sound conveyer and reproducer, the friction shoe 35 is in engagement with the sound conveyer and resists accidental lateral movement thereof, but the resistance of the shoe 35 is not sufficient to prevent lateral movement of the sound conveyer and adjustment of the reproducer to its proper position above the record by the application of a slight pressure. The reproducer having been brought to proper position over the record groove, the knurled head 21 is rotated to permit the sound conveyer and reproducer to lower so as to bring the stylus 2 in operative engagement with the record surface and to engage the member 27 with the gear 28, downward movement of the conveyer being limited by the engagement of the enlargement 18 with the arm 19 of the bracket 15. The driving means for the gear 28 and for the record support having been set into operation, the gear 28 drives the rack 24 through the member 27 to cause the conveyer to swing laterally and the reproducer to move across the record surface, the gear teeth 27 being effectively held in engagement with the gear 28 by the spring 32. When it is desired to disengage the feeding means and lift the reproducer from the record surface, the rod 13 together with the sound conveyer and reproducer carried thereby are raised by the rotation of the knurled head 21. During the up-

ward movement of the rod 13, the teeth of the feeding rack 24 will, by reason of the pivotal mounting of the portion 30 of the rack, remain in operative engagement with the teeth on the gear 27 for a substantial period and preferably until the moment when the sound conveyer has been raised sufficiently to bring the friction shoe 35 into engagement with the sound conveyer. By this construction it will be seen that even during the raising and lowering of the sound conveyer and reproducer, these parts are effectively held against accidental lateral movement. It will be noted that during the raising and lowering of the feeding rack, section 30 of the rack occupies different angular positions with respect to the plane tangent to the periphery of the gear 28 at the point of contact between the said gear and the member 27. For this reason and in order that the said gear and teeth may remain in effective operating engagement with each other, said teeth are curved transversely to the axis of the gear 28, into a convex shape, the most satisfactory construction, as hereinbefore indicated, being obtained by the mounting of a worm 27 in the section 30 of the rack.

Referring to Figs. 3, 4, and 15, the means for rotating the record support and driving the feeding means hereinbefore referred to comprises a motor having the usual rotatable spring barrel 40, to the periphery of which is secured one end of the spring 41, (see Fig. 15), the other end of which is secured to the arbor 42 passing rotatably through the spring barrel and serving as a means for mounting the same upon the bracket 43. The rewinding mechanism for the motor is of common construction and comprises a stud 44 adapted to be engaged by the usual rewinding crank to rotate the gear train 45, 46 and 47. The gear 47 together with the ratchet wheel 48 coaxial therewith are non-rotatably mounted on the arbor 42. a weighted pawl 49 (see Fig. 12) being provided to engage the teeth of the ratchet wheel 48. This pawl permits rotation of the arbor 42 in the direction necessary to put the spring 41 under tension, but prevents rotation of said arbor in the opposite direction. A casing 49' covers the rewinding gear train. Passing through a bushing 50 secured to the spring barrel 40 is a shaft 51 to which the gear 28 hereinbefore referred to is secured and from which the said gear is driven to operate the rack 24 and produce the desired feeding movement of the sound conveyer and reproducer. On the inner face of the spring barrel 40, a spiral gear 52 of slightly greater diameter than the spring barrel is secured, as by screws 53, the gear 52 meshing with and serving to rotate a spiral gear 54 on the vertical spindle 55 (see Fig. 3) rotatably mounted in lugs on the

bracket 56 forming a part of the motor frame. On the upper end of the spindle 55 is secured a pulley 57, a belt 58 being engaged over the pulley 57 and the pulley 59 secured to the spindle 7 on the record support. A pulley 60 mounted on a support 61, pivoted as shown at 62 (see Fig. 4), is pressed against the belt 58 to hold the same taut by a spring 63 engaging the arm 61. In order to increase the friction between the belt 58 and the pulley 59, and at the same time to assist in the insulation of the said pulley and the record support from the vibrations of the motor, the pulley 59 is provided with an annular peripheral portion 64 of cork or similar material. The body portion of the pulley 59 is formed (as shown in Fig. 13) with but one flange, a second flange 65, being secured to the same as by peaning or soldering after the cork 64 is in position. With the above construction, the belt 58, which may be made of leather or other suitable material, serves as does the cork periphery 64 of the pulley 59 to prevent the transmission of vibrations from the motor to the record support, whereby a very true and accurate reproduction is obtainable.

The governor for the motor comprises the usual rotatable spindle 66 mounted in bearings 67 in the motor frame (see Fig. 15). To this spindle the usual governor springs 68 carrying governor weights 69 are secured at one end, the opposite ends of the springs being secured to a collar 70 (see Fig. 14) carrying a friction disk 71 which is longitudinally movable upon the spindle 66 during variations in speed of the governor. The spindle 66 is rotated by spiral gears 72 and 73, the former being rigidly mounted on the spindle 55 and the latter being formed on the spindle 66. The friction pads 74 for the governor are mounted in a frame 75 swiveled in the arm 76 of a right angular lever pivoted intermediate its end in the motor frame, as shown in Fig. 14, the other arm of this lever being shown at 77. The mounting of the friction pads 74 in the swiveled frame is disclosed in my Patent No. 604,740, granted May 31, 1898, and forms no part of the present invention. A spring 78 connected with the lever supporting the swiveled frame 75 and engaging the motor frame tends to rotate the said lever about its axis to hold the friction pads 74 in engagement with the disk 71. For adjusting the position of the friction pads with respect to the disk 71 to secure the desired speed for the motor, I provide an elongated member 79 having a conical or tapered end 80 engaging the arm 77 of the lever supporting the swiveled frame 75, this elongated member 79 being formed with a spiral groove 81, in which engages a stud 82 mounted in a support 83 secured in any suitable way to the bottom of the talking machine cabinet.

The outer end of the member 79 is provided with a knurled head 84 whereby the same may be rotated, the rotation thereof effecting a longitudinal movement thereof by reason of the engagement of the stud 82 in spiral groove 81, and the said longitudinal movement causing the conical portion 80 to slide over the arm 77 to cause the same to adjust the friction pads 74 with respect to the disk 71. Rotation of the head 84 in one direction will, of course, cause the pads to be brought closer to or more firmly in engagement with the disk 71, and rotation of the said head in the opposite direction will cause the pads 74 to move in the opposite direction with respect to the disk 71.

In order to afford a ready ascertainment of the correct or desired angular position of the member 79, I provide a pointer or indicator 85 on the member 79 and a plate or scale 86, with which the pointer or indicator coacts, on the cabinet of the talking machine in proximity to the said pointer or indicator. Suitable inscriptions may be made upon the plate 86, the position of the pointer for normal operation of the machine being indicated in Fig. 17 by the numeral 80 and the direction in which the pointer or indicator 85 should be turned for any desired adjustment being indicated in the said figure by the words "Slow" and "Fast" to the left and right respectively of the numeral 80.

One of the features of my invention is the provision of means whereby the motor, and therefore the record support, is stopped when the reproducer is disengaged from the record surface, and the feeding means are rendered inoperative. The means preferably employed by me for this purpose comprises a lever 87 (see Figs. 14 and 15) pivoted on the spindle 51, one arm of which lever bears upon the under surface of the section 29 of the rack 24. The opposite arm of the lever is downwardly directed and carries at its lower end a friction shoe 89 adapted to be brought into engagement with the disk 71 to stop the motor when the rod 13 is elevated. A spring 89', coiled about the spindle 51 and engaging the lower surface of the lever 87 tends to hold the said lever in engagement with the rack 24 and to rotate the lever about its pivot to bring the shoe 89 into engagement with disk 71 to stop the motor when the sound conveyer and rack are elevated.

My invention also comprises an improved cabinet for talking machines. The cabinet in its preferred form is made of sheet metal and comprises sheet metal top and bottom members 90 and 91 respectively, these members being respectively provided with grooves 92 and 93 in which the upper and lower edges of the side member or members 94 are respectively engaged. Bolts or

equivalent fastening means 95 pass through the top and bottom members 90 and 91 and are provided at their ends with headed members, such as the nuts 96 and 97, shown in Fig. 2 of the drawing, to hold the top and bottom members firmly in engagement with the side members.

It is well known in the art that the cabinet of a talking machine acts as a sounding box and that if the same is set into vibration by the motor, very unpleasant and foreign sounds are produced. These sounds would be present more particularly in a cabinet made of sheet metal unless some means were provided for eliminating the same. In order to avoid this objection I provide a bottom member 98 of wood or other suitable non-metallic material fitting closely against the sides of the cabinet, as shown, which member I secure to the bottom of the cabinet, as by screws 99. The member 98 serves as a support for the motor frame and has been found to very effectively insulate the talking machine cabinet from the vibrations of the motor.

In the modified form of my invention disclosed in Fig. 2A, the metal of the cabinet is forced down into a tapered recess formed in a nut 101 upon the upper end of the rod 95 by means of a threaded member 102 engaging the upper surface of the metal and having a taper corresponding with the taper of the recess 100. A much more rigid device is obtained by this construction than with the structure shown in Fig. 2, in which the top and bottom of the cabinet merely rest on square shoulders on the rod 95 and are clamped between the said shoulders and the flat faces of the nuts 96 and 97.

As it is frequently desirable to obtain access to the interior of the cabinet, I provide a detachable door 103 for the front of the same (see Figs. 1, 3, and 4). This door, as particularly shown in Fig. 1, is in the form of an ornamental grille and is preferably made of sheet metal. The edges of the door, are formed by turning the sheet metal back on itself, as shown at 104, and then outwardly at a right angle to the body of the door as shown at 105. The forward portion of the cabinet in which the opening for the door is provided is formed with flanges 106, against which the flanges 105 of the door are adapted to bear, the upper and lower edges of the door being free from bends, as clearly shown in Fig. 3 and fitting in the grooves 92 and 93 respectively. As the top and bottom of the cabinet are made of resilient material, the upper and lower edges of the door may obviously be disengaged from the recesses 92 and 93 by a slight forward pull on the door. The same resilient characteristic of the top and bottom of the cabinet will also permit the door to be readily put back into closed position.

For covering the openings in the door 103 and at the same time causing the sound waves to diffuse as they leave the sound amplifier and to emanate uniformly throughout substantially the whole extent of the door, I provide a covering 107 of suitable thin fabric, such as pongee silk, the edges of this covering being preferably clamped in place between the superposed portions, shown at 104, of the metal of the door.

Numerous changes may obviously be made in the specific structure herein disclosed without departing from the spirit of my invention, and I wish, therefore, not to be limited to the exact details herein disclosed.

Having now described my invention, what I claim as new therein and desire to protect by Letters Patent is as follows:—

1. In a phonograph or talking machine, the combination of a rotatable record support, driving means for said support comprising a speed governor, a reproducer, a sound conveyer carrying the reproducer and movable to engage the reproducer with or disengage the same from a record carried by said support, and means coacting with said governor to cause said driving means to be automatically stopped by the movement of the conveyer to disengage the reproducer from the record, substantially as described.

2. In a phonograph or talking machine, the combination of a rotatable record support, driving means for said support comprising a speed governor, a reproducer movable into or out of engagement with a record carried by said support, and means coacting with said governor to cause said driving means to be automatically stopped by the movement of the reproducer out of engagement with the record, substantially as described.

3. In a phonograph or talking machine, the combination of a rotatable record support, driving means for said support comprising a speed governor, a reproducer, a sound conveyer carrying the reproducer and movable to engage the reproducer with or disengage the same from a record carried by said support, means for producing a relative feeding movement between the reproducer and a record carried by said support, and means coacting with said governor to stop said driving means, said feeding means being rendered inoperative and said stopping means operative by the movement of the conveyer to disengage the reproducer from the record, substantially as described.

4. In a phonograph or talking machine, the combination of a record support, a sound conveyer, a reproducer connected to said sound conveyer, means coacting with said conveyer for resisting the movement of the reproducer across said record support, said means being operative at different positions

assumed by the reproducer in its movement across the record, and means having a single controlling device for rendering said resisting means operative and stopping the rotation of said record support, substantially as described.

5. In a phonograph or talking machine, the combination with a record support, of a reproducer, a sound conveyer carrying said reproducer and extending without flexible joint from the space above to the space below the record support, said conveyer being movable in a substantially straight line to permit the reproducer to be moved into and out of engagement with a record carried by said support, and means comprising a manually operable cam for moving said conveyer to disengage said reproducer from the record, substantially as described.

6. In a phonograph or talking machine, the combination of a record support, a movable sound conveyer, a reproducer connected with said sound conveyer, and means comprising a rotatable driving member and a rack normally coacting with said driving member for moving said conveyer and producing a relative feeding movement between said reproducer and record support, said rack being movable to different angular positions with respect to the surface of said rotatable driving member without moving out of engagement with said driving member and having a convex portion contacting said rotatable member, said convex portion being curved transversely of said member, substantially as described.

7. In a phonograph or talking machine, the combination with a sound conveyer, of feeding means therefor comprising a rotatable driving member, a rack coacting therewith and arranged at an angle to the vertical, means for engaging said rack with and disengaging the same from said driving member, said rack comprising a plurality of sections, one secured to said second named means and one adapted for operative engagement with said driving member, said sections being connected for relative movement permitting said second named section to remain in engagement with said driving member during a limited movement of said first named section away from said driving member, and yielding means tending to hold said second named section in engagement with said driving member, substantially as described.

8. In a phonograph or talking machine, the combination with a sound conveyer, of feeding means therefor comprising a rotatable driving member, a rack coacting therewith, and means for engaging said rack with and disengaging the same from said driving member, said rack comprising a plurality of sections, one secured to said second named means and one provided with a

feeding portion curved transversely of said member and adapted for engagement therewith, said sections being connected for relative pivotal movement permitting said second named section to remain in engagement with said driving member during a limited movement of said first named section away from said driving member, substantially as described.

9. In a phonograph or talking machine, the combination with a movable sound conveyer, of a friction member adapted to engage the mouth of said conveyer to resist lateral movement of the latter, at different positions assumed by the same in its lateral movement, substantially as described.

10. The combination of a rotatable record support, a reproducer in operative relation thereto, a sound conveyer connected to said reproducer, a longitudinally movable pivot member for said sound conveyer, and means controlled by the longitudinal movement of said pivot member to stop the rotation of said record support, substantially as described.

11. The combination of a rotatable record support, a reproducer in operative relation thereto, a sound conveyer carrying said reproducer, a longitudinally movable pivot member secured to said sound conveyer, said reproducer being movable into and out of engagement with a record carried by said support by the longitudinal movement of said pivot member, and means controlled by the longitudinal movement of said pivot member to effect the starting and stopping of the rotation of said record support, substantially as described.

12. The combination of a rotatable record support, a reproducer in operative relation thereto, a sound conveyer connected to said reproducer, a longitudinally movable pivot member for said sound conveyer, means for producing a relative feeding movement between said reproducer and said record support, and means controlled by the longitudinal movement of said pivot member to stop the rotation of said record support and to simultaneously render said feed producing means inoperative, substantially as described.

13. An improved rack comprising a plurality of sections connected for pivotal movement about a given axis, one section being adapted to be secured to a support for pivotal movement about an axis at an angle to said first named axis, the other section being provided adjacent the end thereof with feeding means, said feeding means being curved transversely of the length thereof into a convex shape and extending in a curve having its center located in said second named axis, substantially as described.

14. An improved rack provided with means whereby the same may be supported

for pivotal movement about a given axis, said rack being also provided with feeding means, said feeding means being curved transversely of the length thereof into a convex shape and arranged in the form of a curve having its center located in said axis, substantially as described.

15. An improved rack provided with means whereby the same may be supported for pivotal movement about a given axis, said rack being also provided with a worm shaped feeding portion having its axis arranged in the form of a curve having its center located in said first named axis, substantially as described.

16. The combination of a sound amplifier, a mounting for said amplifier permitting lateral movement thereof, and a friction member, said amplifier and friction member being arranged to permit the mouth of the amplifier to slide laterally over the friction member, substantially as described.

17. The combination of a record support, a conveyer movable relatively thereto, means for producing a relative feeding movement between said conveyer and said record support, means coacting with the mouth of said conveyer for resisting movement of said conveyer relatively to said record support at different positions of the said conveyer, and means for simultaneously rendering said feeding means inoperative and said resisting means operative, substantially as described.

18. The combination of a record support, a conveyer movable relatively thereto, means for producing a relative feeding movement between said conveyer and said record support, means frictionally coacting with the mouth of said conveyer for resisting movement of said conveyer relatively to said record support at different positions of the said conveyer, and means for simultaneously rendering said feeding means inoperative and said resisting means operative, substantially as described.

19. In a phonograph or talking machine, the combination of a record support, a sound conveyer, a reproducer connected to said sound conveyer, means coacting with the mouth of said conveyer for resisting the movement of said reproducer across said record support, said means being operative at different positions assumed by the reproducer in its travel across the record support, and means for simultaneously rendering said resisting means operative and causing said reproducer to be lifted away from said record support, or for simultaneously rendering said resisting means inoperative and causing said reproducer to move toward said support, substantially as described.

20. In a phonograph or talking machine, the combination of a record support, a sound conveyer, a reproducer connected to said

sound conveyer, means frictionally coacting with the mouth of said conveyer for resisting the movement of said reproducer across said record support, said means being operative at different positions assumed by the reproducer in its travel across the record support, and means for simultaneously rendering said resisting means operative and causing said reproducer to be lifted away from said record support, or for simultaneously rendering said resisting means inoperative and causing said reproducer to move toward said support, substantially as described.

21. In a phonograph or talking machine, the combination of a record support, a reproducer, a sound conveyer carrying said reproducer and extending without flexible joint rearwardly, then downwardly and then forwardly under said record support, said reproducer having a stylus mounted with sufficient freedom of movement with respect to the sound conveyer to permit the same to accommodate itself to surface irregularities in a record carried by said support, and means mounting said conveyer for pivotal movement about an axis a substantial distance to the rear of said reproducer to permit the reproducer to travel across the record, said means comprising means for moving the conveyer to cause the reproducer to be engaged with or disengaged from the record and means for guiding said sound conveyer in a substantially straight line during such movement, substantially as described.

22. In a phonograph or talking machine, the combination of a record support, a reproducer above said support, a sound conveyer carrying said reproducer and extending without flexible joint rearwardly, then downwardly and then forwardly under said record support, said conveyer being mounted for pivotal movement about an axis a substantial distance to the rear of the reproducer to permit said reproducer to travel across a record carried by said support and being capable of movement to permit said reproducer to be engaged with or disengaged from the record, feeding means for effecting the pivotal movement of the conveyer, and unitary means for shifting said conveyer to cause the reproducer to be disengaged from the record and for rendering said feeding means inoperative, substantially as described.

23. In a phonograph or talking machine, the combination of a record support, a reproducer, a sound conveyer carrying said reproducer and extending rearwardly, then downwardly and then forwardly under said record support, said reproducer having a stylus mounted with sufficient freedom of movement with respect to the sound conveyer to permit the same to accommodate

itself to surface irregularities in a record carried by said support, and means mounting said conveyer for pivotal movement about an axis a substantial distance to the rear of said reproducer to permit the reproducer to travel across the record, said means comprising means for moving the conveyer to cause the reproducer to be engaged with or disengaged from the record and means for guiding said sound conveyer in a substantially straight line during such movement, substantially as described.

24. In a phonograph or talking machine, the combination of a record support, a reproducer above said support, a sound conveyer carrying said reproducer and extending without flexible joint rearwardly, then downwardly and then forwardly under said record support, said conveyer being mounted for pivotal movement about an axis a substantial distance to the rear of the reproducer to permit said reproducer to travel across a record carried by said support and being capable of rectilinear movement to permit said reproducer to be engaged with or disengaged from the record, feeding means for effecting the pivotal movement of the conveyer, and unitary means for shifting said conveyer to cause the reproducer to be disengaged from the record and for rendering said feeding means inoperative, substantially as described.

25. In a phonograph or talking machine, the combination of a record support, a reproducer, a sound conveyer carrying said reproducer and extending rearwardly, then downwardly and then forwardly under said record support, and means mounting said conveyer for pivotal movement about an axis a substantial distance to the rear of said reproducer to permit the reproducer to travel across the record, said means comprising means for moving the conveyer to cause the reproducer to be engaged with or disengaged from the record and means for guiding said sound conveyer in a substantially straight line during such movement, substantially as described.

26. In a phonograph or talking machine, the combination of a record support, a reproducer above said support, a sound conveyer carrying said reproducer and extending rearwardly, then downwardly and then forwardly under said record support, said conveyer being mounted for pivotal movement about an axis a substantial distance to the rear of the reproducer to permit said reproducer to travel across a record carried by said support and being capable of movement to permit said reproducer to be engaged with or disengaged from the record, feeding means for effecting the pivotal movement of the conveyer, and unitary means for shifting said conveyer to cause the reproducer to be disengaged from the

record and for rendering said feeding means inoperative, substantially as described.

27. In a phonograph or talking machine, the combination of a record support, a cabinet carrying the same, a reproducer, and a sound conveyer carrying said reproducer and extending rearwardly, then downwardly past said record support, and then forwardly within said cabinet, and means mounting said conveyer for pivotal movement about an axis a substantial distance to the rear of said reproducer to permit the latter to travel across a record carried by said support, said means comprising means for moving the conveyer to cause the reproducer to be engaged with or disengaged from the record and means for guiding said conveyer in a substantially straight line during such movement, substantially as described.

28. In a phonograph or talking machine, the combination of a record support, a reproducer above said support, a sound con-

veyer carrying said reproducer and extending rearwardly, then downwardly and then forwardly under said record support, said conveyer being mounted for pivotal movement about an axis a substantial distance to the rear of the reproducer to permit said reproducer to travel across a record carried by said support and being capable of rectilinear movement to permit said reproducer to be engaged with or disengaged from the record, feeding means for effecting the pivotal movement of the conveyer, and unitary means for shifting said conveyer to cause the reproducer to be disengaged from the record and for rendering said feeding means inoperative, substantially as described.

This specification signed and witnessed this 9th day of August 1912.

THOS. A. EDISON.

Witnesses:

FREDERICK BACHMANN,
ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

1,184,704.

ELECTRICAL SYNCHRONIZER FOR TALKING
MOTION PICTURES,

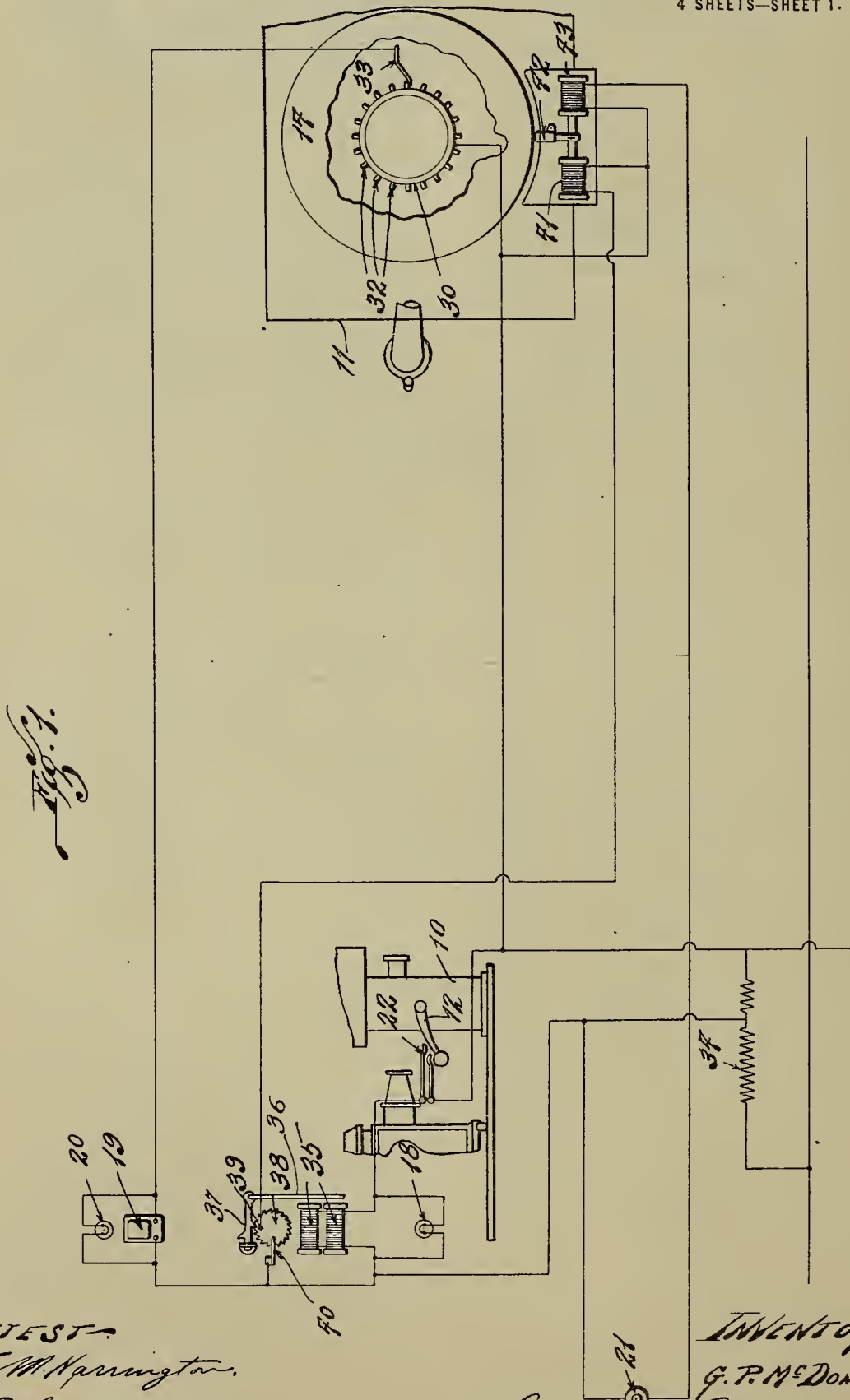
1,184,704-----G.P. McDonnell,
Patented-May 23rd, 1916.
Filed-Aug. 11th, 1913.

G. P. McDONNELL.
ELECTRICAL SYNCHRONIZER FOR TALKING MOTION PICTURES.
APPLICATION FILED AUG. 11, 1913.

1,184,704.

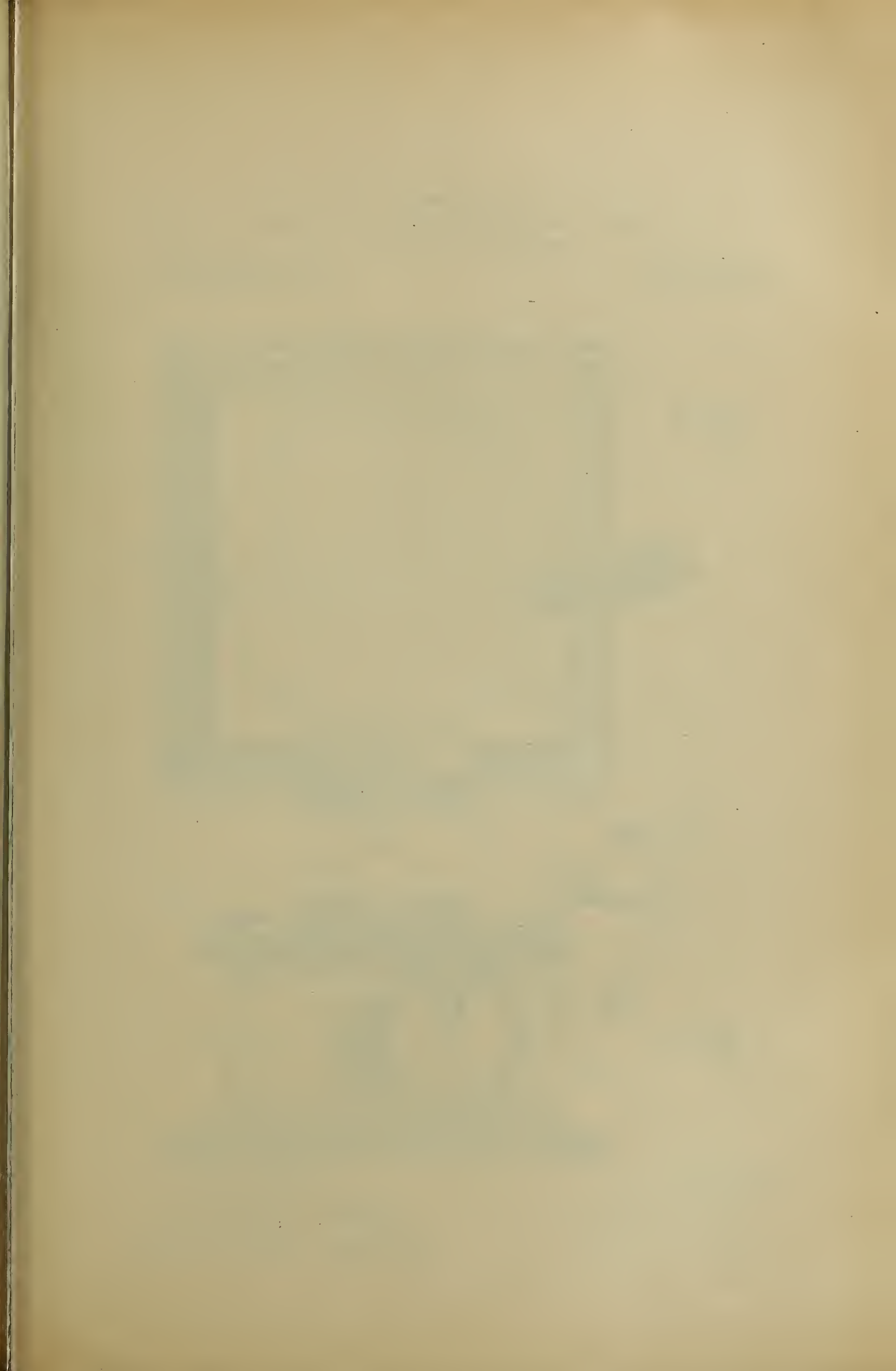
Patented May 23, 1916.

4 SHEETS—SHEET 1.



WITNESSES:
F. M. Harrington.
R. B. Orwig.

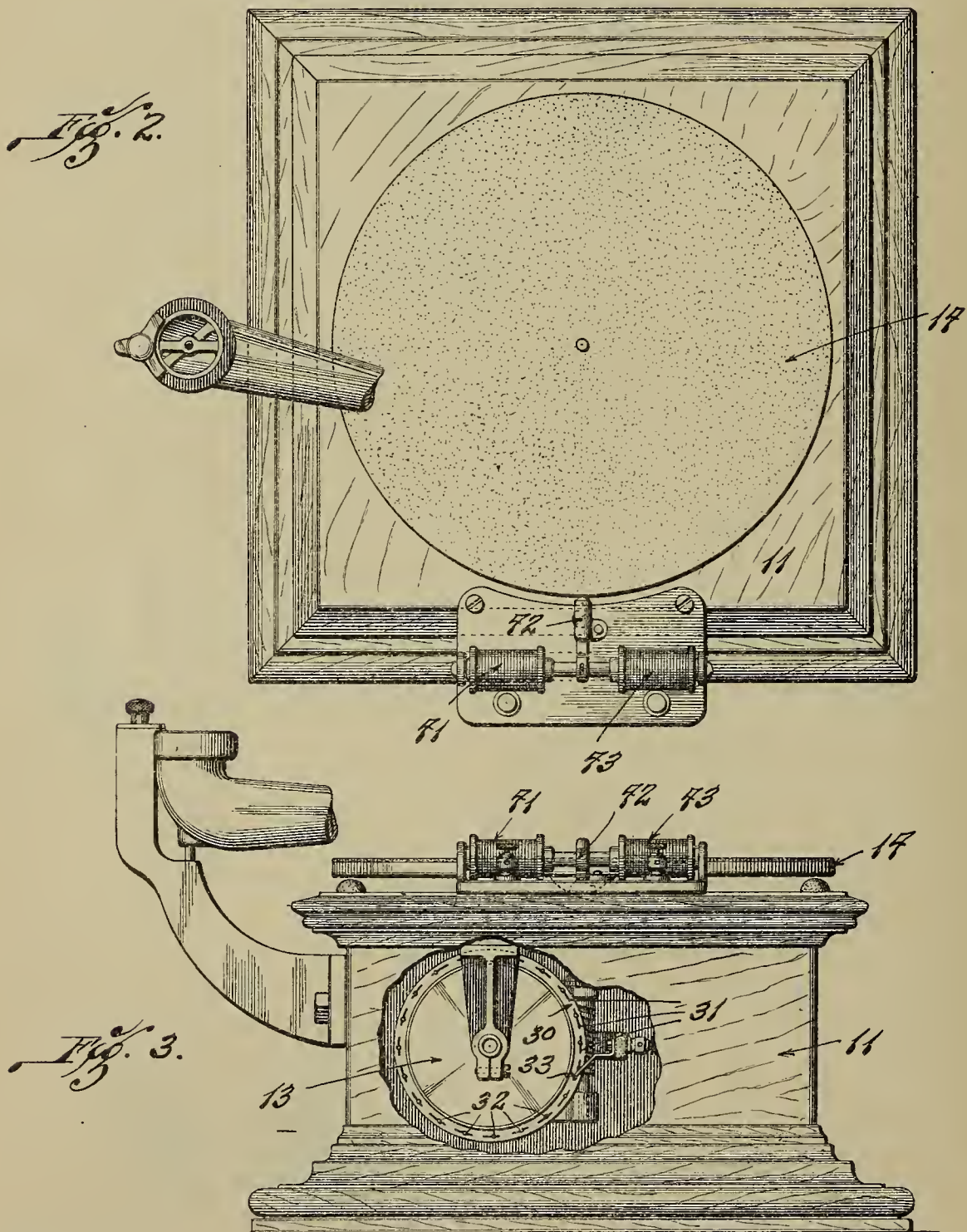
INVENTOR:
G. P. McDONNELL,
By Higdon & Langan, ATTORNS.



G. P. McDONNELL.
ELECTRICAL SYNCHRONIZER FOR TALKING MOTION PICTURES.
APPLICATION FILED AUG. 11, 1913.

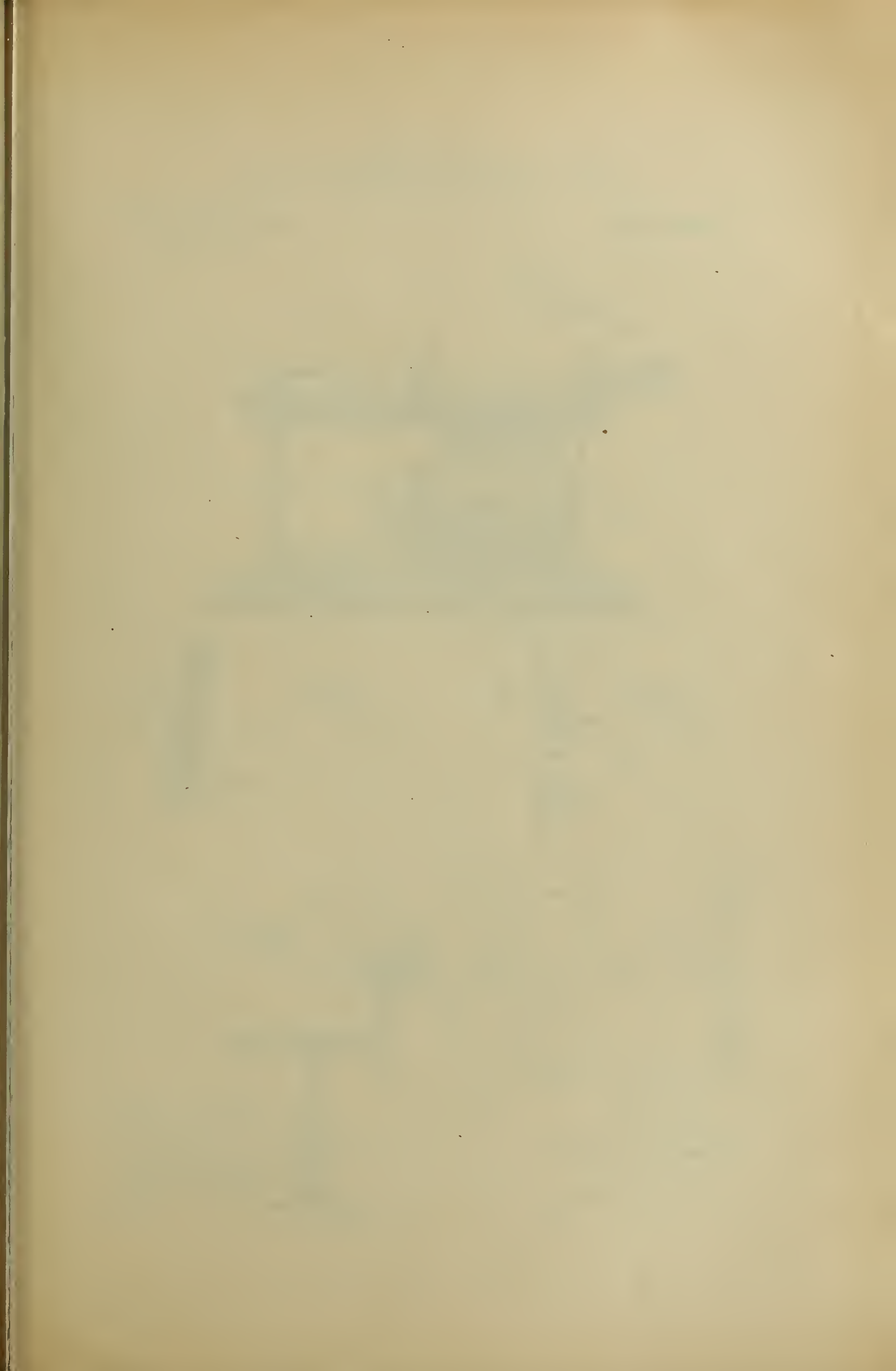
1,184,704.

Patented May 23, 1916.
4 SHEETS—SHEET 2.



WITNESSES:
E. M. Harrington.
D. C. Orwig.

INVENTOR:
GEORGE P. McDONNELL,
BY Higdon Horgan, ATTS.

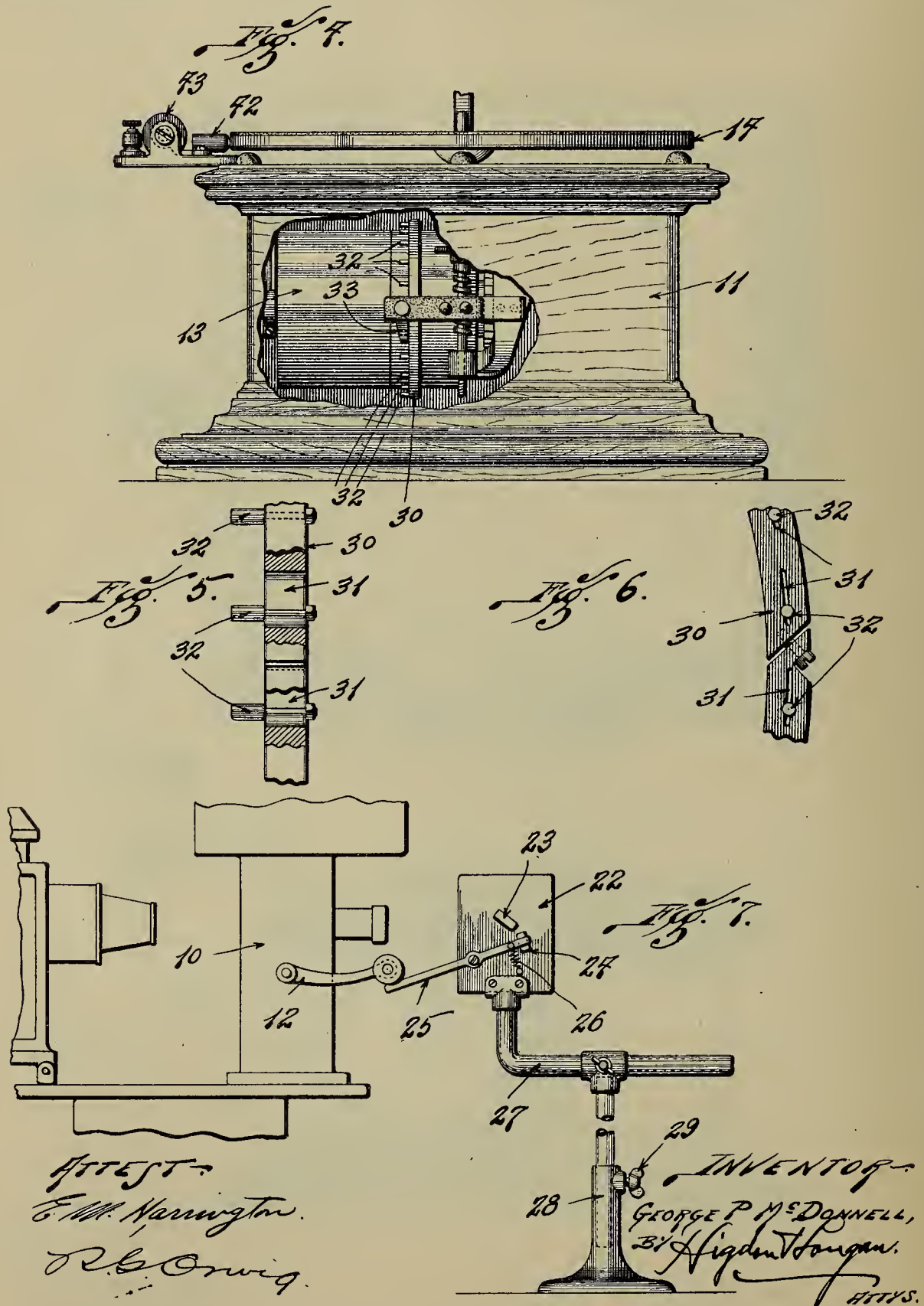


G. P. McDONNELL.
ELECTRICAL SYNCHRONIZER FOR TALKING MOTION PICTURES.
APPLICATION FILED AUG. 11, 1913.

1,184,704.

Patented May 23, 1916.

4 SHEETS—SHEET 3.

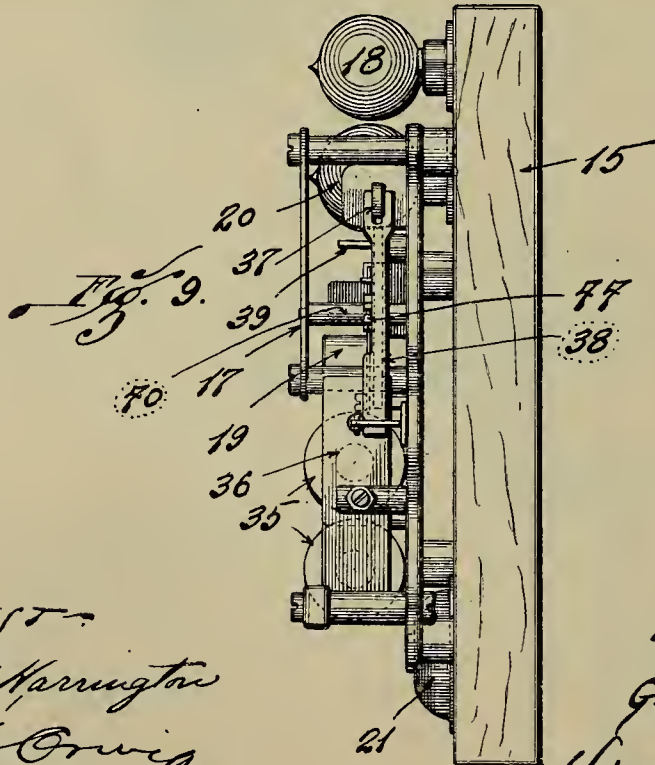
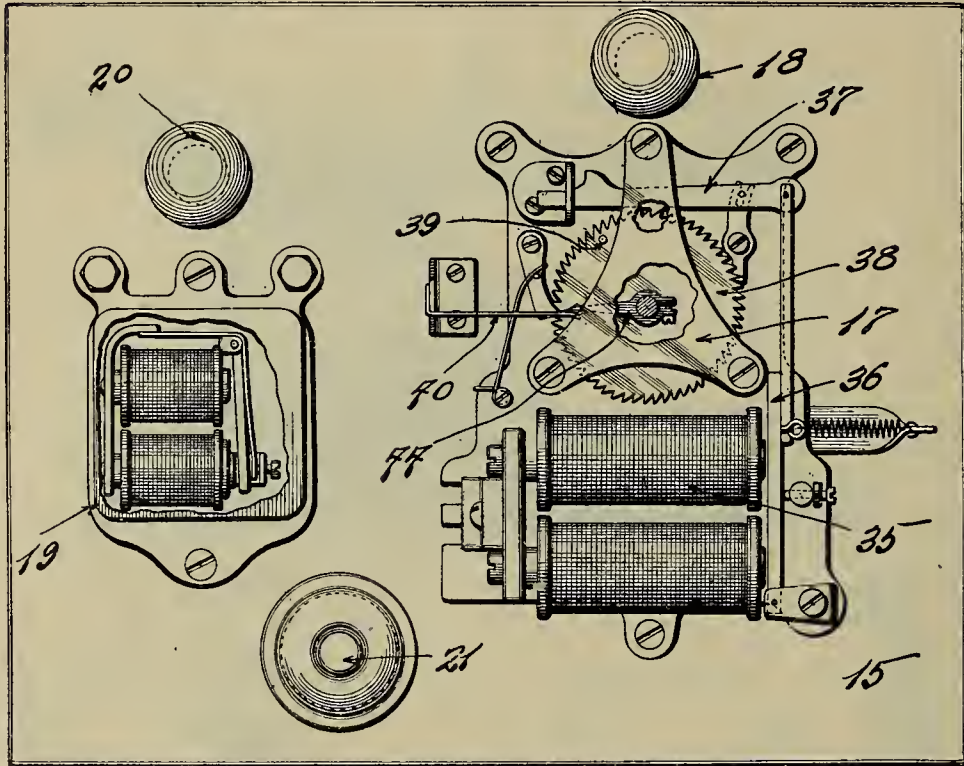


G. P. McDONNELL.
ELECTRICAL SYNCHRONIZER FOR TALKING MOTION PICTURES.
APPLICATION FILED AUG. 11, 1913.

1,184,704.

Patented May 23, 1916.
4 SHEETS—SHEET 4.

Fig. 8.



Witness:
E. M. Harrington
J. B. Orwig.

INVENTOR:
GEORGE P. McDONNELL,
BY *Higdon Tongue* atty.

UNITED STATES PATENT OFFICE.

GEORGE P. McDONNELL, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO JOHN M. HOCKMUTH, OF ST. LOUIS, MISSOURI.

ELECTRICAL SYNCHRONIZER FOR TALKING MOTION-PICTURES.

1,184,704.

Specification of Letters Patent.

Patented May 23, 1916.

Application filed August 11, 1913. Serial No. 784,237.

To all whom it may concern:

Be it known that I, GEORGE P. McDONNELL, a citizen of the United States, and resident of St. Louis, Missouri, have invented certain new and useful Improvements in Electrical Synchronizers for Talking Motion-Pictures, of which the following is a specification containing a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to an improved electrical synchronizing-mechanism for talking motion-picture machines, and the object of the invention is to produce a higher efficiency in machines of this class.

My invention consists, generally, of the combination with a motion-picture machine and a talking machine, of a suitable electric signaling-device for said motion-picture machine, to indicate its speed; another signaling-device for said talking-machine, to indicate its speed to the operator of said motion-picture machine; said signaling-devices having unequal resistance; a suitable circuit in which said signaling-devices are included in multiple; a suitable circuit maker and breaker actuated by said motion-picture machine, to periodically make and break the circuit on said signaling-device of said motion-picture machine; another circuit maker and breaker actuated by said talking-machine, to periodically make and break the circuit on said talking-machine signaling-device during operation of said talking-machine; a suitable source of electricity (as a main line of high voltage) to which said circuit is connected; and a suitable resistance interposed in said circuit between said signals and the source of electricity, to reduce the voltage of said circuit to such degree that the current delivered thereover will be too weak to actuate both of said signaling-devices simultaneously to any practical degree, but strong enough to operate (or display) periodically during the operation of the machine to which it is connected the signaling-device which has the least resistance, and said current traversing said circuit being also strong enough to alternately operate the signaling-devices of both of said machines, whereby the signals of both machines will be operated alternately when said motion-picture machine and said talking-machine are not in synchro-

nism and only the signaling-device of one of said machines will be operated (or displayed) when said machines are in synchronism.

My invention consists further of the combination with a talking-machine motor, of an annular or ring-like arrangement of electrical-contacts carried by said motor and arranged thereon to be adjusted nearer to or farther from each other, for the purpose of changing the time of contact, as required for use in connection with a motion-picture machine operable at various rates of speed.

My invention consists further in certain additional novel features of construction which will be hereinafter described and specifically designated in the appended claims.

In the drawings, Figure 1 shows in diagram a synchronizing apparatus constructed according to my invention; Fig. 2 is a plan of a phonograph showing my improved starting and stopping device; Fig. 3 is an elevation of a phonograph, partly broken away, illustrating the starting and stopping device and also the variable timing means; Fig. 4 is an elevation of the phonograph taken at right angles to Fig. 3, the side of the box being broken away to show more fully the timing means; Fig. 5 is a fragmental edge elevation partly in section of a ring which is secured to the motor of the phonograph and shows the arrangement of the contact points carried by the ring; Fig. 6 is a fragmental side elevation of the ring shown in Fig. 5, showing the means for connecting the ends of the ring; Fig. 7 shows in elevation a portable and adjustable circuit maker and breaker and its arrangement relative to a motion picture machine; Fig. 8 is a face view of a signal board and illustrates the detail construction of the signal devices; and Fig. 9 is an edge elevation of the structure shown in Fig. 8.

Referring by numerals to the accompanying drawings: 10 designates the motion picture machine and 11 a phonograph which are or may be of any desired construction. The picture machine is of the manually operated type and is provided with the usual crank 12 for its manipulation. The phonograph is of the ordinary type having a spring motor 13 and a rotating record-carrier 14. The type of phonograph shown is that of the disk record class.

I do not wish to be limited to the forms of machines shown, but they embody the essentials to my invention which are a manually controlled motion picture machine and a phonograph operable by a normally energized motor. Arranged adjacent the operator of the motion picture machine or at least within his range of sight and hearing there is a board 15 which carries a common signal device 17 in electrical circuit with a light 18 arranged to be operated by a movement of the motion picture machine, an audible signal device 19 of a well-known construction and a light 20 arranged to be operated upon a movement of the phonograph and also a push-button 21 whose office will be explained hereinafter. Arranged adjacent the motion picture machine is a switch 22 carrying a fixed contact 23 and a movable contact 24, the movable contact being mounted upon a pivoted arm 25 in the path of travel of the crank 12 of the motion picture machine. To normally hold the movable contact removed from the fixed contact there is a contractile coil spring 26.

The switch as a whole is preferably secured to an L-shaped support 27 which is adjustably secured to a standard 28, the standard being provided with a set screw 29 whereby it may be altitudinally adjusted. By this universal adjustability of the switch stand the switch may be placed in an operative position relative to the motion picture machine without changing the position of the motion picture machine.

The switch just described is in circuit with the signal device 17 and the light 18 so that unless influenced, as will be hereinafter more fully explained, by the signal device connected with the phonograph the signal 17 and the light 18 will be operated upon each revolution of the crank 12 of the motion picture machine. Secured to the rotor of the phonograph motor there is a ring 30 provided with a plurality of slots 31 in which are adjustably secured the contact points 32. Secured to a stationary part of the motor 13 is a brush 33 arranged in the path of the contact points 32. The brush 33 and the contact points 32 are in circuit with the signal device 19 and the light 20 and are arranged to produce both an audible and visible signal each time the brush 33 engages a contact point carried by the rotor of the motor.

In order to avoid possible confusion which would exist if both signal apparatuses were simultaneously operated, I arrange the signals in such manner as to cause only the signal connected with the phonograph to operate when the phonograph and picture machine are in synchronism.

It is to be noted here that the signal connected with the motion picture machine is operable only when the two machines are out

of synchronism so that the operator, by observing the time of the two signals, may reduce or increase the speed of the manually controlled machine to establish synchronism. For example, if the signal of the phonograph is produced before the signal of the motion picture machine then the operator will speed up the motion picture machine to bring it to the time of the phonograph, or if the signal of the motion picture machine is before the signal of the phonograph then the operator will reduce the speed of the picture machine to bring it to time with the signal of the phonograph.

The means for effecting the operation of only one signal device during synchronism comprises a volt reducer or resistance 34 which is in the line between the signal devices and the service wires and also a difference in the construction of the signal devices themselves which will offer less resistance in the one instrument than in the other, that is, the windings in the coils may vary in the audible signal devices, and the filaments in the lights or visible signals may vary so that the energy measured or determined by the resistance will, upon the establishment of a circuit between the phonograph and its signal device, produce both a visible and audible signal as to the speed or movement of the phonograph. The said resistance 34 is so great as to prevent the passage of any current directly across the wires of the circuit at the point where said resistance is located, thus obviating wastage of current. Said resistance 34 is of common construction, and is preferably not adjustable, as is a rheostat.

The signal device 17 and the light 18 are in the same circuit as the signal devices just described connected with the phonograph. The before mentioned common signal device 17 is of such character as to offer a higher resistance to the energy than does the signal device 19 connected with the phonograph, and the combined resistance of the two or various signal devices, is too great for the voltage of the circuit, thereby making it impossible for both signals to be operated at the same time and causing the selection for operation of the signal connected with the phonograph, which offers the less resistance. By reason of the slots 31 in said ring 30 carrying the contacts 32 in the phonograph the spacing of the contacts may be adjusted, and thereby the timing of the contacts may be varied.

The average speed of a motion picture machine is sixty revolutions per minute or one revolution per second. In such a condition I space apart the contact points 32 so that there will be a contact with the brush at intervals of one second apart, or sixty times per minute. If a certain film requires greater speed of the motion picture machine,

these contacts 32 must be moved closer together, or if certain other films are used which require a slower speed the contact points 32 must be moved at wider intervals.

5 In the signal apparatus 17 there is an electromagnet 35 in circuit with the switch 22 so that upon each operation of the switch the magnet is energized. 36 designates an armature which is operable by the said magnet.
 10 This armature itself vibrates and makes the usual click which is the audible signal employed in connection with the picture machine. Operable by the armature 36 there is a common detent arm 37 having the usual
 15 slot-and-pin detent arranged to engage with a ratchet wheel 38, the teeth of which are spaced apart distances equal to predetermined distances in the film lengths. The said arm 37 serves primarily as a means for moving the said ratchet-wheel 38 forward, and
 20 after the same has been so moved it is locked by the said slot-and-pin detent, in the usual manner. For example, we will assume that the spacing of said teeth represents one foot
 25 of film. Opposite one of said teeth and connected with the ratchet wheel there is a contact point 39. Secured to the board 15 in the path of the contact point 39 there is a brush 40. The contact point 39 and the brush 40
 30 are in a normally broken circuit with a common core-repelling electro-magnet 41 located in proximity to the phonograph, which magnet operates to release a common frictional stop device 42, pivotally secured to the
 35 phonograph and adapted to be swung to engage or disengage the record carrier. By this means I am enabled to take care of the film titles so that the phonograph will not be set in motion until the titles have been
 40 "run off."

The push-button 21, previously referred to, is in normally broken circuit with a second electro-magnet 43 arranged adjacent the phonograph. This magnet is also connected with the stop device 42 so that when
 45 the film has been wholly exhibited the phonograph may be stopped by the operator touching the button 21. The said stop-device, or brake, 42 is held in release position by the inertia and friction of its parts, and
 50 I have found that no other force is necessary for such function.

On various makes of films, the title lengths vary and in order to facilitate the
 55 operation of setting the machine to take care of the varying lengths of titles I have provided an indicator 44. This indicator is useful in order that the operator need not be put to the task of counting the number
 60 of ratchet teeth with respect to the location of the contact 39 each time a new film is used. If the operator is using one make of film, all of which have a fixed title length, this indicator will readily point to the proper
 65 location of the contact 39.

In the practical operation of my machine assuming a film to be placed in position in the picture machine, the contact point 39 moved to a position corresponding with the
 70 feet length of the title on the film, a record applied to the phonograph the motor of which has been energized the stop devices set in position to hold the record-carrier against
 75 movement, the operator by a movement and the contact points 32 spaced from the brush 33 of the crank 12 of the picture machine sets the picture machine in motion to exhibit its title. At each operation of the crank 12
 80 the switch device 22 is operated. Each time the switch is operated the electro-magnet 35 is energized and through the medium of the armature 36 and the detent 37 the ratchet wheel 38 is moved a distance of one tooth. When the title has been wholly exhibited
 85 the contact point 39 carried by the ratchet wheel engages the brush 40 thereby establishing a circuit which energizes the electro-magnet 41 at the phonograph which effects a release of the stop device 42 so that
 90 the phonograph is set in motion. At this time, the phonograph being in motion, the contact points 32 in connection with the brush 33 produce a signal which, due to the uniform speed of the phonograph, is maintained at uniform intervals of time. At each
 95 revolution of the motion picture machine crank there is formed a contact which will operate the signal device 17 so that the operator has both a visible and audible signal from each instrument which may be instantly compared as to time.
 100

For reasons hereinbefore given if the machines are in synchronism only the signal from the phonograph will be made, and if
 105 the machines are out of synchronism one signal will be slightly in advance of the other, so that the operator may, by manipulating the picture machine, bring the machines to synchronism.

I claim:

1. An improved synchronized apparatus for talking motion-picture machines, comprising the combination with a motion picture machine and a talking machine, of an
 110 electric signaling-device electrically connected to said motion-picture machine; another electric signaling-device connected to said talking-machine; said two signaling-devices having unequal resistance; a suitable circuit in which both of said signaling
 115 devices are included in multiple; a suitable circuit maker and breaker to be actuated by said motion-picture machine in periodically making and breaking the circuit on said signaling device which is connected
 120 to said motion-picture machine; another circuit maker and breaker actuated by said talking-machine, to periodically make and break the circuit on its signaling-device during operation of said talking-machine;
 125 130

a suitable source of electricity to which said circuit is connected; and a suitable resistance interposed in said circuit between said signals and said source of electricity, to reduce the voltage of said circuit to such degree as will prevent the operation of both of said signaling-devices simultaneously to any practical extent, but leaving the voltage of said circuit sufficiently high to operate (or display) periodically during operation of the machine to which it is connected the signaling-device of less resistance, and sufficiently high to alternately operate the signaling-devices of both machines; whereby the signals of both of said machines will be operated alternately when said motion-picture machine and said talking-machine are out of synchronism, and only the signaling-device of one of said machines will be operated or displayed when said machines are operating in synchronism.

2. In combination with a motor driven phonograph and a manually controlled motion picture machine, a synchronizing apparatus comprising a signal device electrically connected in circuit with each of said machines, and the said signal-devices having unequal resistance, means for causing the motor driven phonograph to intermittently operate the signal device associated therewith at intervals proportionate to its movement, means for causing the manually controlled motion picture machine to intermittently operate the signal device associated therewith at intervals proportionate to its movement, and a resistance in said circuit for causing only the less resistance signal device associated with the motor driven phonograph to be operated when the two signal device operating means are simultaneously actuated by the two machines.

3. In combination with a phonograph having the usual motor for driving the same, a motion picture machine, a signal device for said phonograph, a signal device for

said motion picture machine, and means substantially as described at said phonograph and said motion picture machine for effecting the operation of said signal devices at intervals proportionate to their speeds, the said means at the phonograph being a contact-carrying ring having a series of slots and mounted on the periphery of said phonograph motor, and a series of contacts which are adjustably mounted in said slots on the said ring, for the purpose of relatively timing the said signal devices of said phonograph and the said motion picture machine.

4. In a synchronized apparatus for talking motion picture machines, a manually-controlled motion picture machine, a phonograph having the usual motor, a stop-device for controlling the motor of said phonograph, an electric signal for said motion picture machine, an electric signal for said phonograph, an electric circuit whose strength of current is too low to simultaneously operate the signals of both picture machine and phonograph, but which current is strong enough to operate through the resistance of said signals one at a time, and said circuit being common to both signals and to both picture machine and phonograph, the resistances of the said signals being unequal, and circuit making and breaking devices at said picture machine and at said phonograph, the signal of said motion picture machine comprising a toothed element carrying a contact which is in the said circuit, whereby a given film length may be moved prior to the release of the said phonograph stop-device.

In testimony whereof, I have signed my name to this specification, in presence of two subscribing witnesses.

GEORGE P. McDONNELL.

Witnesses:

E. L. WALLACE,
N. G. BUTLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

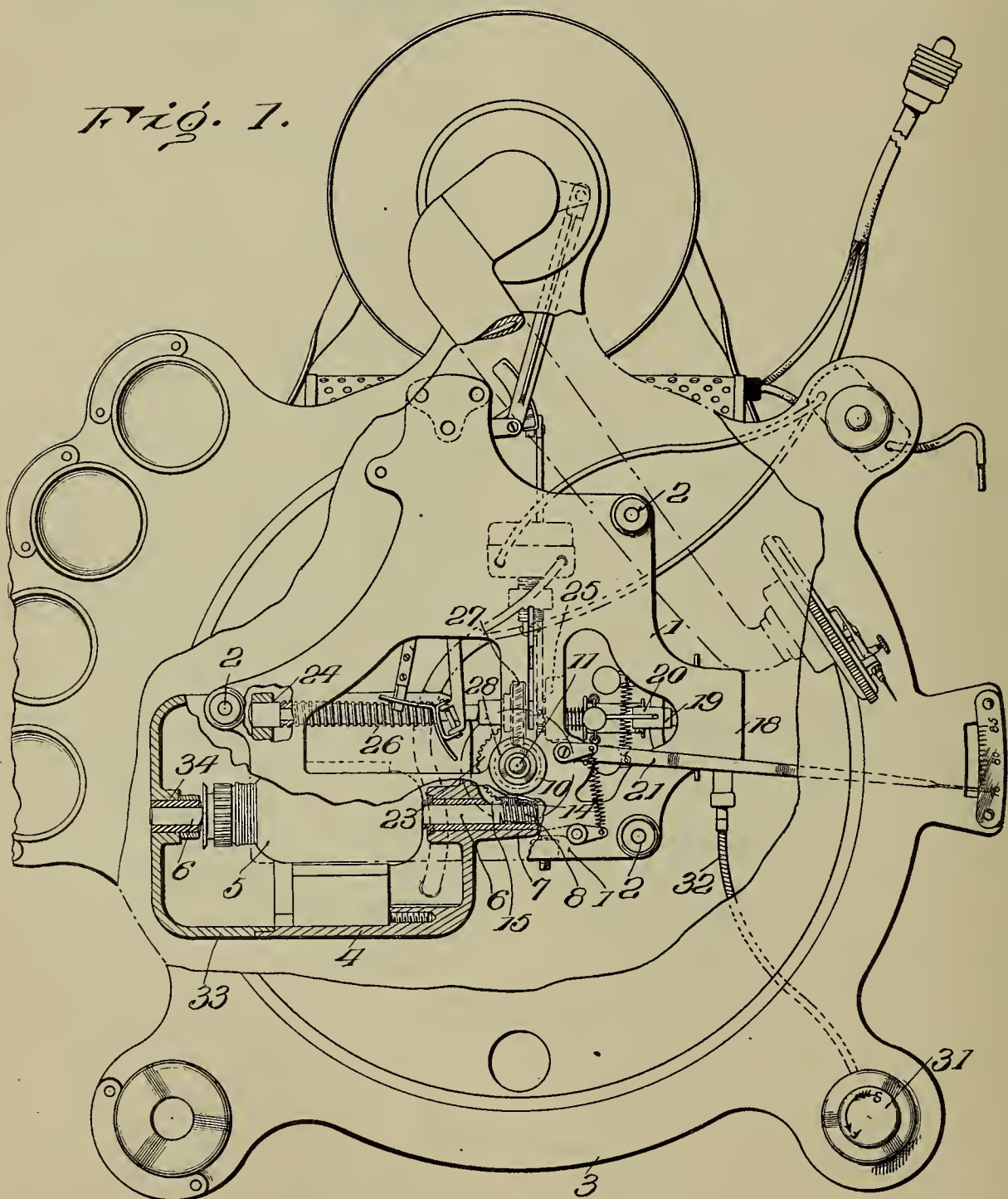
TALKING MACHINE,
#1,184,907-----C. E. Woods,
Patented-May 30th, 1916.
Filed-September 13th, 1913.

C. E. WOODS.
TALKING MACHINE.
APPLICATION FILED SEPT. 13, 1913.

1,184,907.

Patented May 30, 1916.
5 SHEETS—SHEET 1.

Fig. 1.

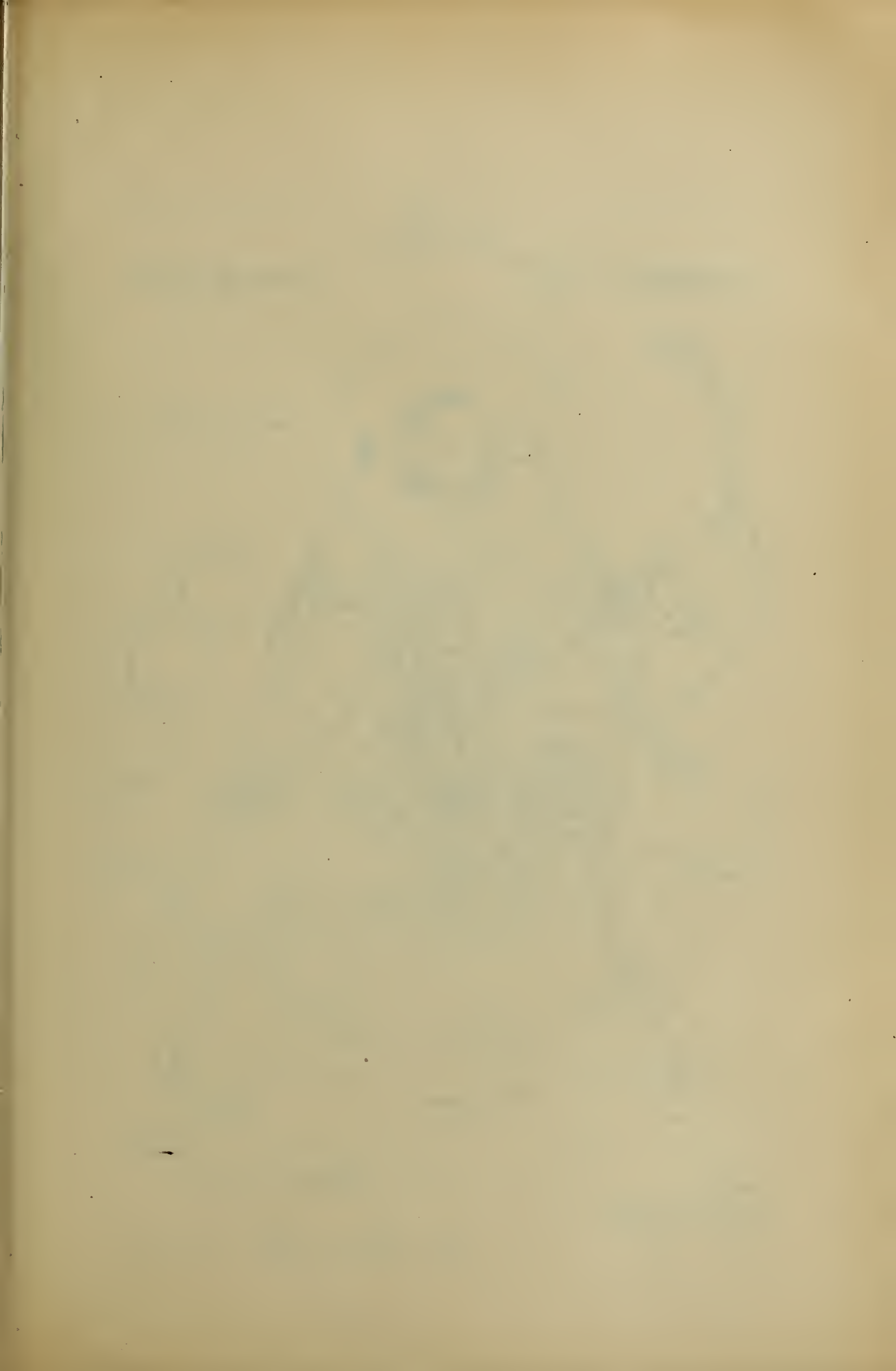


Inventor

Witnesses
Jas. H. Anderson
E. E. Warfield.

Charles E. Woods.

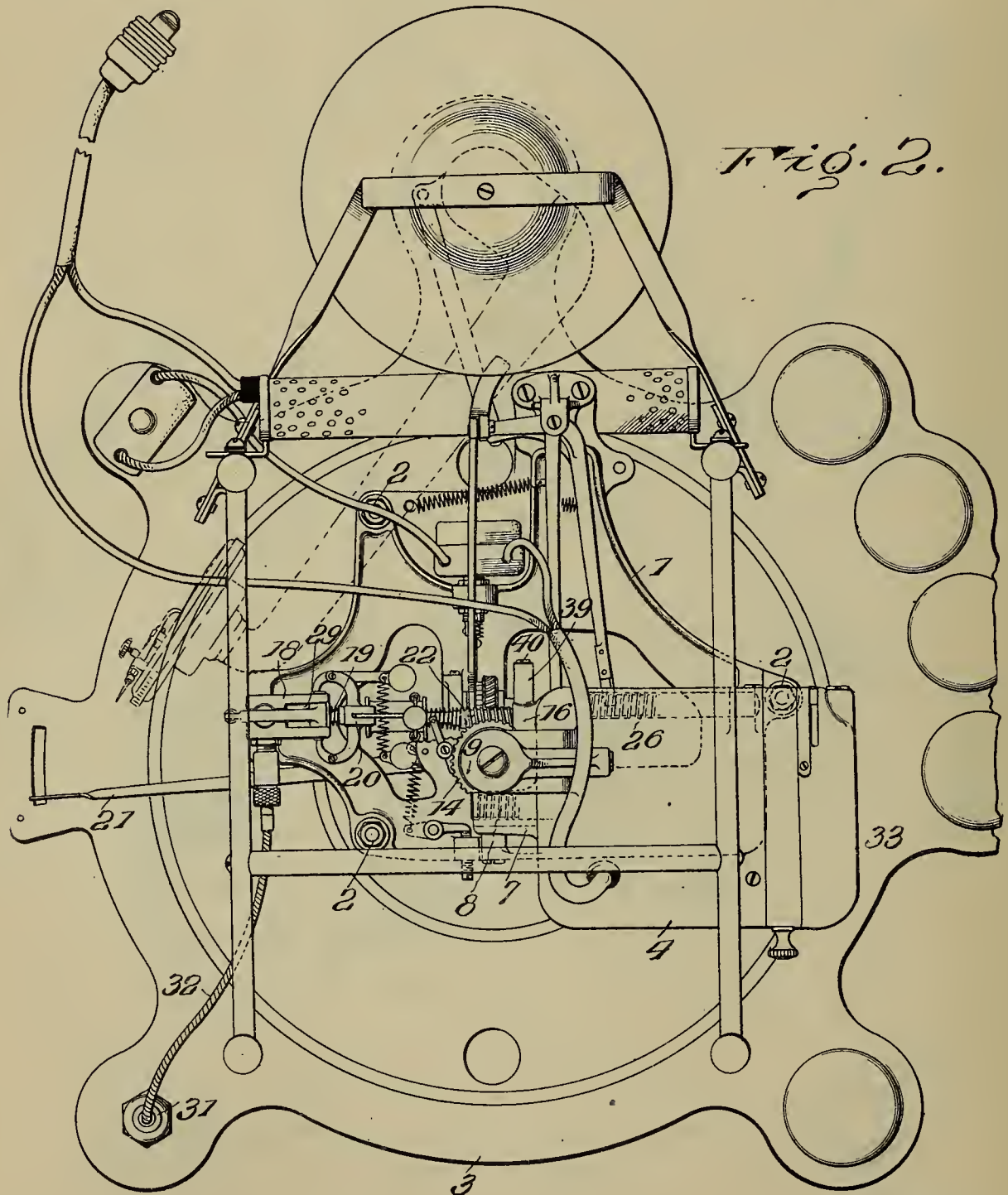
By
Lawrence L. Lewis & Associates
Attorneys



C. E. WOODS
TALKING MACHINE.
APPLICATION FILED SEPT. 13, 1913.

1,184,907.

Patented May 30, 1916.
5 SHEETS—SHEET 2.



Inventor

Clinton E. Woods,

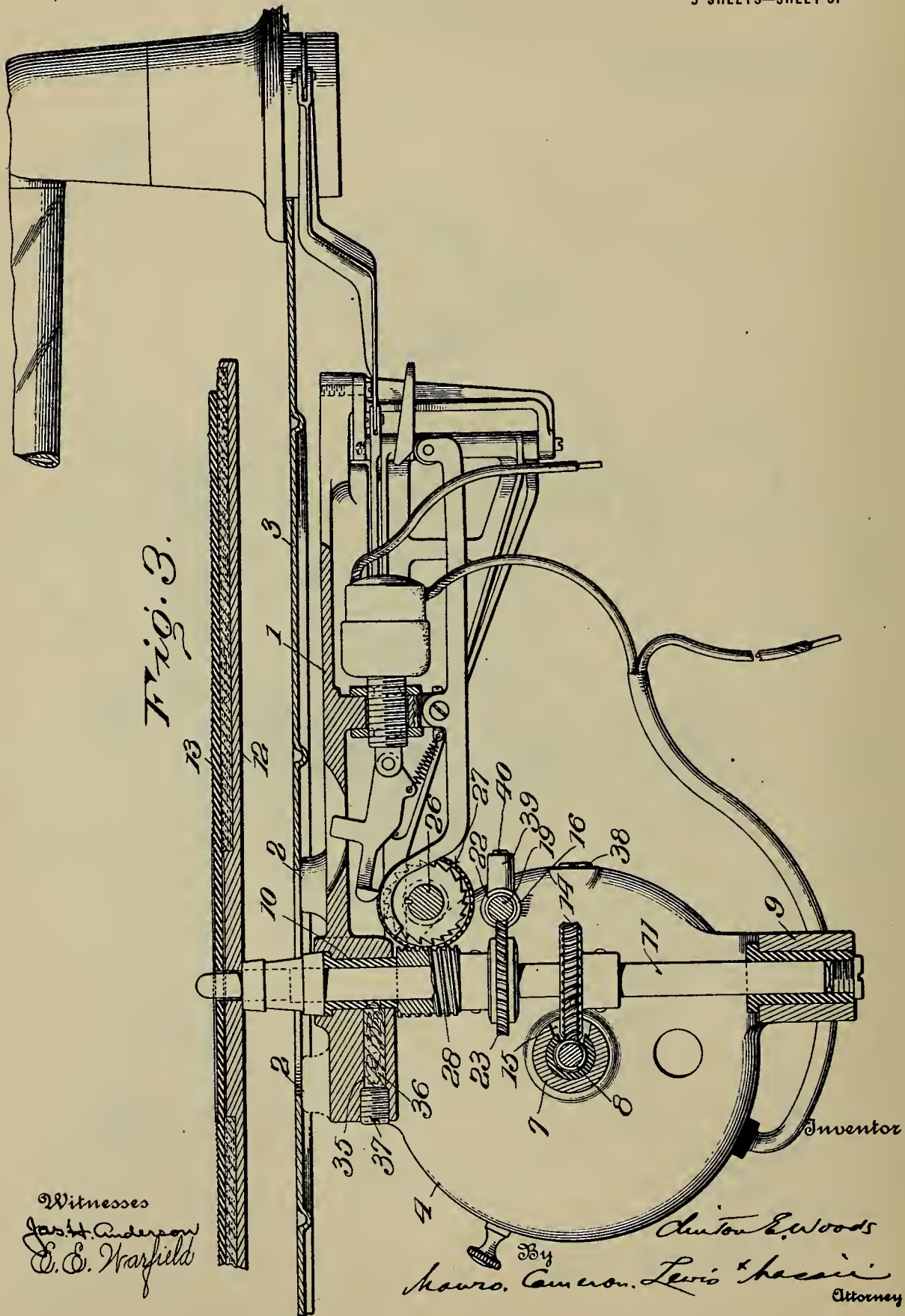
Witnesses
Jas. H. Anderson,
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C. E. WOODS.
TALKING MACHINE.
APPLICATION FILED SEPT. 13, 1913.

1,184,907.

Patented May 30, 1916.
5 SHEETS—SHEET 3.



1,184,907.

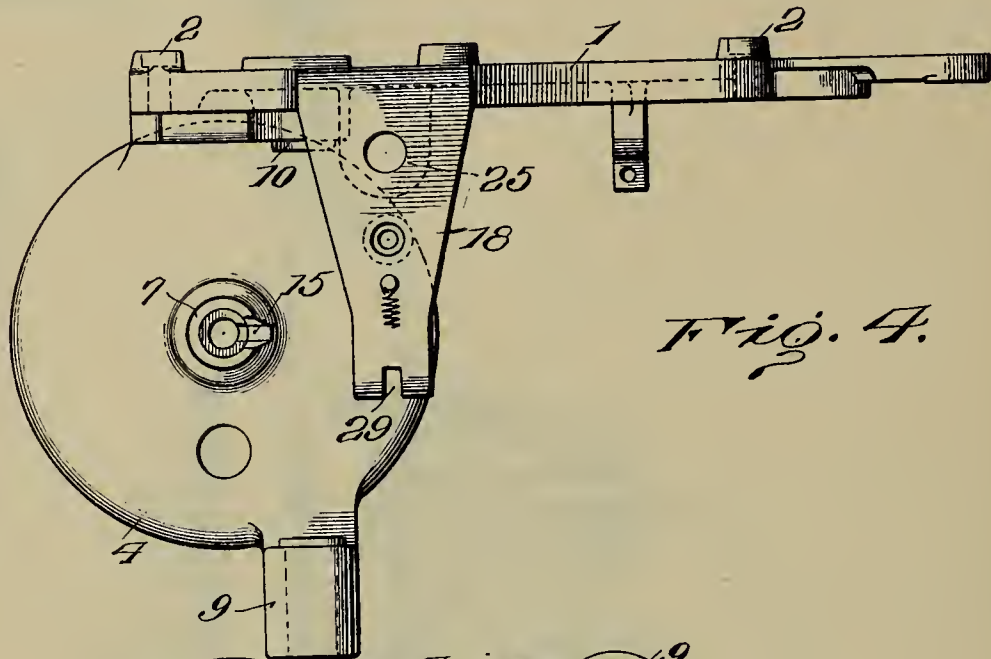


Fig. 4.

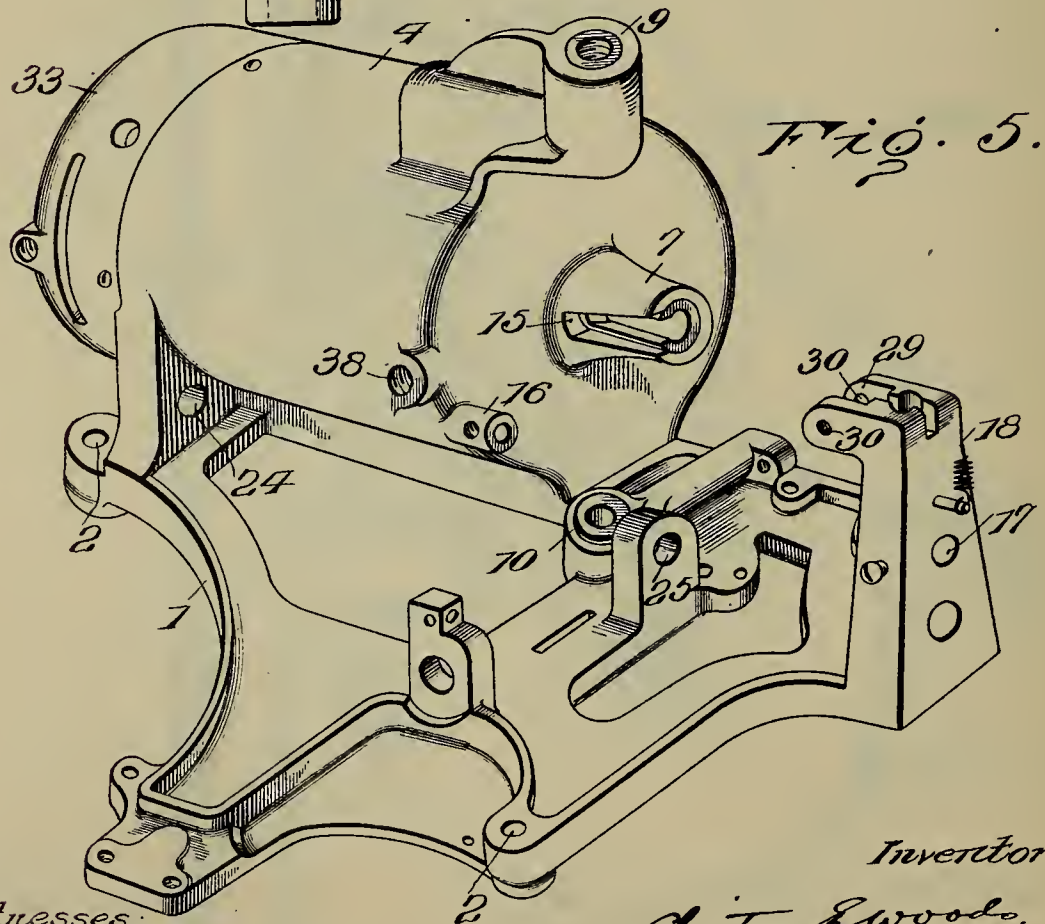
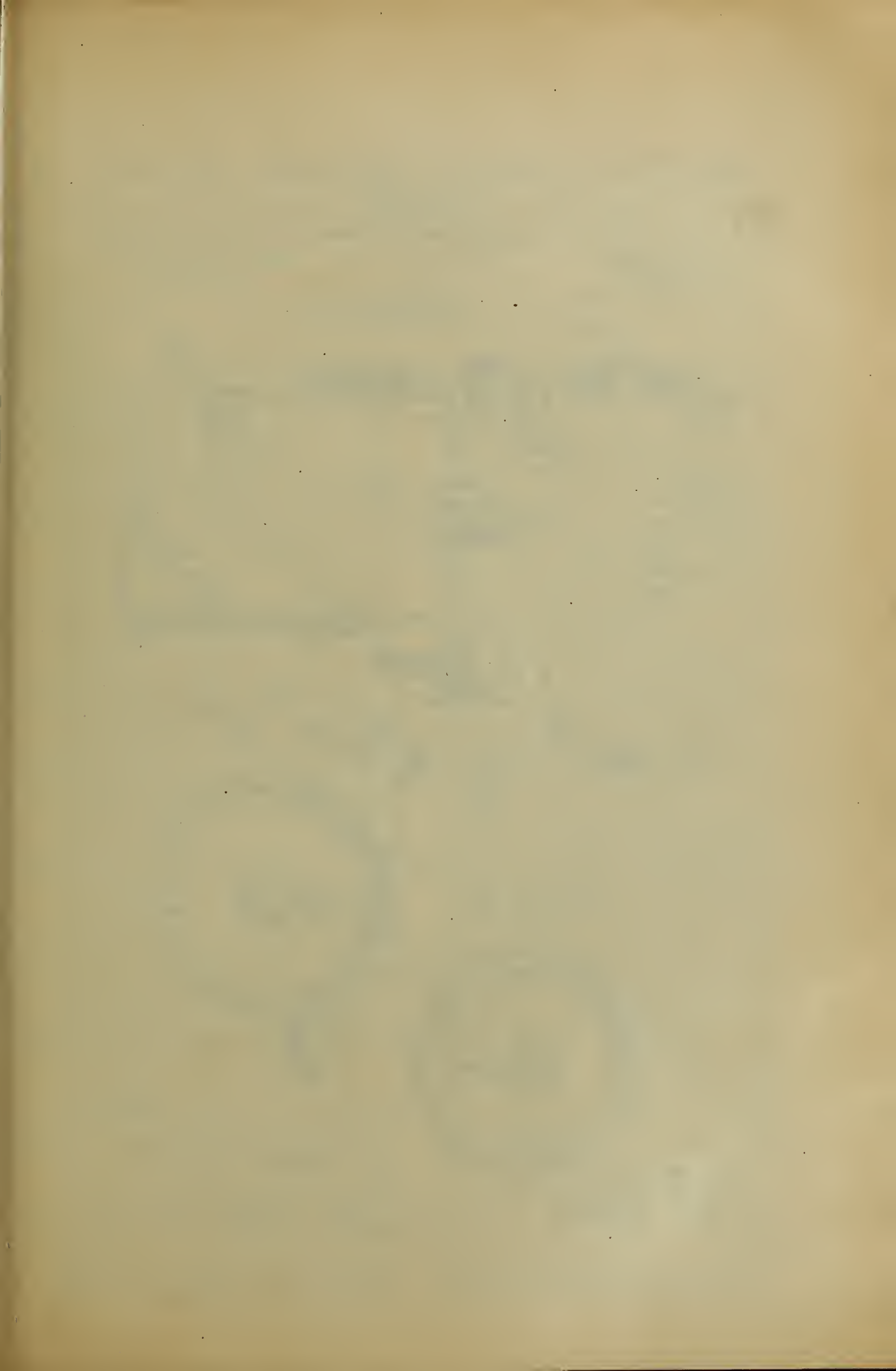


Fig. 5.

witnesses:
Jos. S. Anderson,
E. E. Warfield.

Inventor.
Clinton E. Woods.
Hans, Cameron, Lewis & Thorne, Attorneys.



C. E. WOODS.
TALKING MACHINE.
APPLICATION FILED SEPT. 13, 1913.

1,184,907.

Patented May 30, 1916.
5 SHEETS—SHEET 5.

Fig. 6.

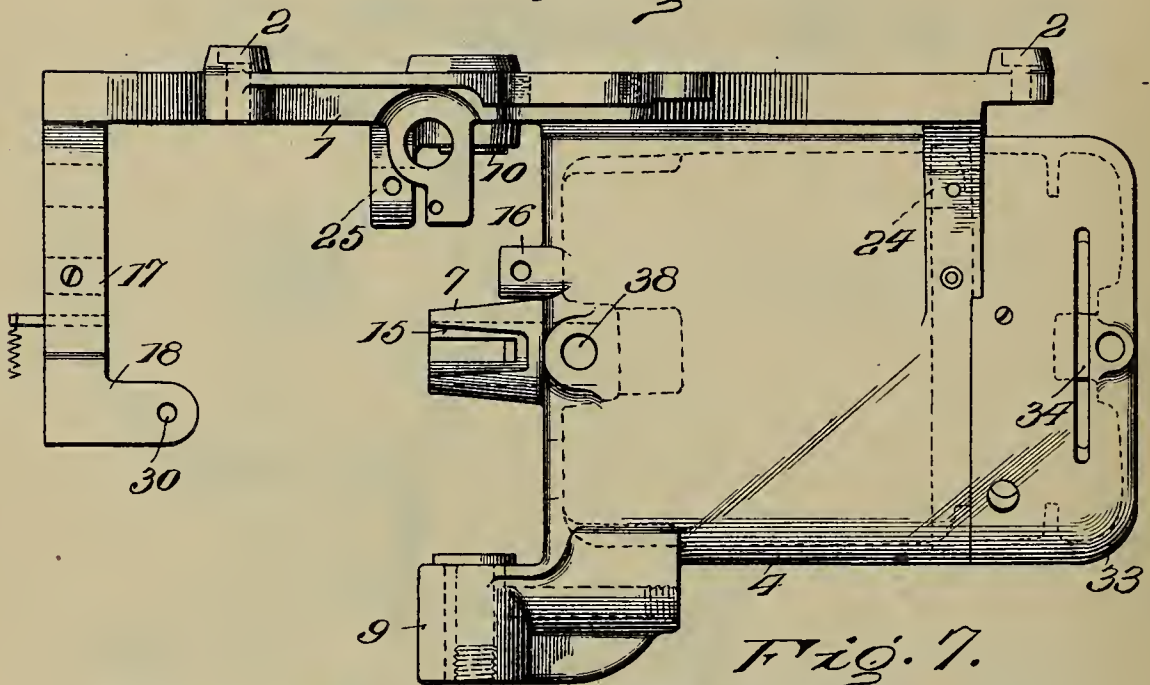


Fig. 7.

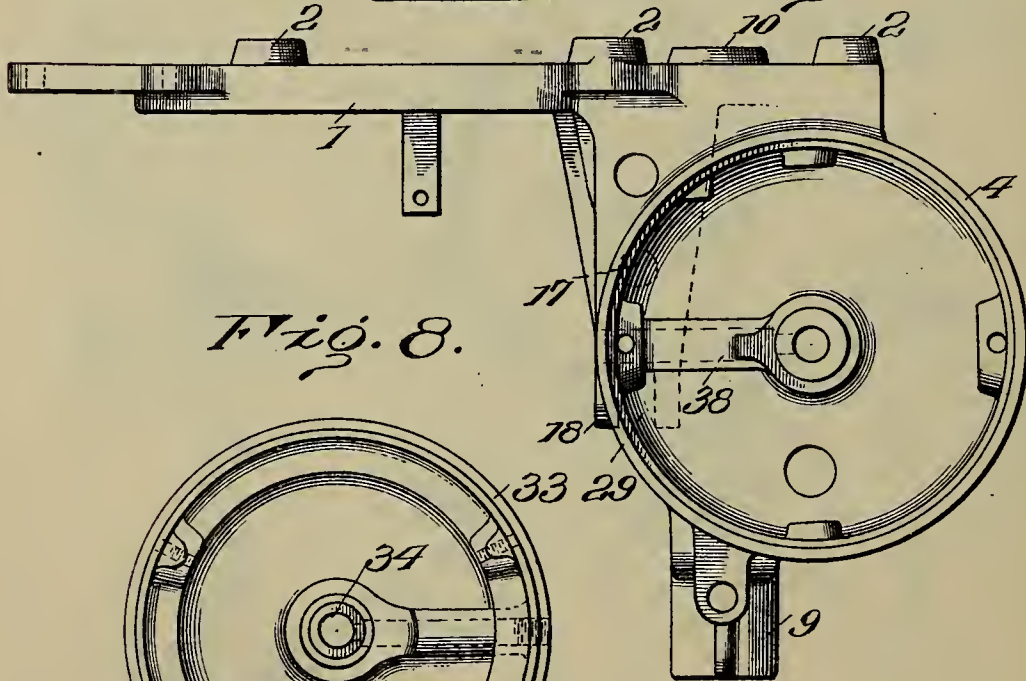
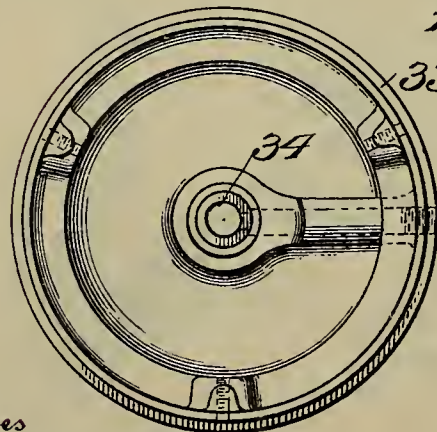


Fig. 8.



Inventor

Clinton E. Woods,

Witnesses
James H. Anderson,
E. E. Warfield

By *Mauro, Cameron, Lewis & Shassee*
Attorneys

UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

TALKING MACHINE.

1,184,907.

Specification of Letters Patent.

Patented May 30, 1916.

Application filed September 13, 1913. Serial No. 789,676.

To all whom it may concern:

Be it known that I, CLINTON E. WOODS, of Bridgeport, Connecticut, have invented a new and useful Improvement in Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to talking machines, and has for its object to simplify and improve the construction thereof, to the end that the cost of construction of the machine may be materially reduced, while at the same time increasing the efficiency and accuracy of operation thereof, and rendering it free from vibrations due to the operation of the parts, which vibrations would materially interfere with the reproduction of the sound-vibrations.

In talking machines as constructed at the present time, comprising a motor and a record propelled thereby, there is usually provided a speed-governor for the motor, and a speed-indicator for indicating the number of revolutions per minute imparted by the motor to the record; and in some instances, a suitable start-and-stop mechanism is associated with the parts, for the purpose of automatically starting or stopping the machine, said start-and-stop mechanism comprising, as one of its elements, a driven shaft controlling its operation.

By the present invention, the several shafts operating the record, speed-governor, speed-indicator and start-and-stop mechanism, are operatively connected to the motor-shaft in an improved way, and all of the shafts find bearing in a suitable frame, preferably integrally cast of some such metal as aluminum, whereby the accuracy of location of the bearings is enhanced, and the freedom from vibration or play of the parts is obtained.

In accordance with the invention the metal frame carrying the record table, the motor, the speed governor, the speed indicator and the start-and-stop mechanism, is suspended from the motor-board which is formed of thin sheet metal, and is therefore more or less flexible in character. Mounted on the motor-board independently of the said frame is an adjusting device for the governor, a scale coöperating with the pointer of the indicator, and a controlling device for the start-and-stop mechanism; and such connections as are necessary be-

tween these last-mentioned parts and the rigid frame are flexible or yieldable so that any inaccuracies in the location of the parts on the motor-board, or any deflection or distortion of the motor-board, will not in any way affect the normal operation.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for the sake of illustrating the invention, is shown in the accompanying drawings, but such drawings are for the purpose of illustration only, and are not to be taken as defining the limits of the invention, reference being had to the appended claims for this purpose.

In said drawings Figure 1 is a top plan view, with parts broken away; Fig. 2 is a bottom plan view; Fig. 3 is a vertical elevation, with parts shown in section; Fig. 4 is an end view of the frame of the machine; Fig. 5 is a perspective view thereof; Fig. 6 is a side elevation of the same; Fig. 7 is an end view, taken opposite to that of Fig. 4; and Fig. 8 is a cap-plate of the motor-casing, showing the interior face thereof.

Referring to the drawings, in which like reference numerals indicate like parts, 1 is a frame, preferably of cast aluminum, which frame is provided with a plurality of openings 2, 2, by means of which it is secured by suitable bolts to the under side of a supporting motor-board 3, and from which it depends, as shown in Fig. 3. The motor-board 3 is formed of thin sheet metal and is therefore more or less liable to deflection or distortion under stress. The bolts which secure the frame 1 to the motor-board pass through suitable apertures which are located as accurately as possible; but it is well known that, in the fabrication of sheet metal devices, it is extremely difficult, if not in fact impossible, to punch or drill holes with mathematical accuracy of location. Forming an integral part of the frame 2 is a motor-casing 4, within which any suitable motor, as an electrical motor 5, is mounted, the motor-shaft 6 thereof having bearing in the end walls of said casing. One end wall (the left, as shown in Fig. 6) of the casing has a hub or teat extension 7, and the projecting end of the shaft 6 has a worm formed thereon, which worm is supported by the inner walls of said hub or teat.

On the motor-casing there is formed a

vertical shaft bearing 9 integral therewith, and in the frame vertically above said bearing 9 is formed a companion bearing 10, within which a shaft 11 (Fig. 3) revolves.

5 This shaft extends upward through the motor-board 2, and bears on its upper end a table 12, upon which a record 13 rests. The shaft 11 has keyed thereto a worm gear 14, which meshes with the worm 8 on the shaft
10 6 through a slot 15 (Figs. 5 and 6), formed in the hub or teat 7. By this means, the record is revolved directly by the driven shaft 11, which in turn is directly propelled by the motor shaft with the single interven-
15 ing worm gear connection and the support given the projecting end of the motor shaft by the inner walls of the hub or teat 7 renders it possible to employ such worm, and at the same time avoid any spring or yielding of
20 the worm under the strain imparted to it by the worm gear. This direct propulsion of the record from the motor shaft, and the possibility of employing the highly desirable form of worm gear, act to greatly im-
25 prove the accuracy of operation of the machine and the accuracy of revolution of the record, and to eliminate vibrations due to the operation of the mechanism.

Referring to Figs. 5 and 6, 16 is a shaft
30 bearing formed as an integral part of the motor-casing 4, and 17 is a bearing formed in line therewith, in a depending arm 18, also integral with the frame 1. Turning in said bearings is a shaft 19 (Fig. 1), on
35 which shaft is mounted the speed-governor 20 and the mechanism for controlling the speed-indicator needle 21. The specific construction of the speed-governor and the speed-indicator is preferably that shown in
40 my pending application Serial No. 770,717, filed on the 29th day of May, 1913, and since such specific construction forms no part of the present invention, it need not be further described herein. On the shaft 19 there is
45 formed a worm 22, gearing with a worm gear 23 on the driven shaft 11, so that the speed-governor and the speed-indicator shaft 19 are driven directly from said driven shaft. As concerns the speed-indicator, it
50 should be observed that this comprises a horizontally swinging pointer adapted to cooperate with a scale carried by the motor-board. The scale is without direct positive connection to the parts of the speed-indi-
55 cator proper, and minor inaccuracies or defects in the initial construction or assemblage of the devices do not affect the speed indications.

Referring to Fig. 5, 24 and 25 are bear-
60 ings formed in the frame 1, within which is mounted the start-and-stop controlling shaft 26 (Fig. 3), which is provided with a worm gear 27 meshing with a worm 28 on the shaft 11, so that the start-and-stop device is con-
65 trolled directly from the driven shaft 11.

The start-and-stop device may be of any suitable or desired construction. Preferably, and as herein shown, it is of the kind shown and described in my pending application Serial No. 788,827, filed on the 9th
70 day of Sept., 1913.

* It will be observed that the start-and-stop mechanism is mounted entirely on the frame 1, and is provided with a controlling device independently mounted on the motor-board,
75 the controlling device comprising, as a part thereof, the usual swinging tone arm. The tone arm is mounted in an aperture of the motor-board, but on account of possible in-
80 accuracies in the location of the aperture, or on account of distortion of the motor-board, the tone arm may vary slightly from its true predetermined position with respect to the
85 frame 1 and the other parts of the apparatus. The tone arm is connected to the
90 start-and-stop mechanism by means of a link having pivotal connections at its ends which may be more or less loose to accom-
95 modate any inaccuracies or minor defects in the construction or assemblage of the parts. In the lower end of the depending lug or
100 arm 18 is formed a slot 29, provided with bearings 30, 30, for the fulcrum of the lever (not shown) controlling the speed-gov-
105 ernor, which lever is operated by any suitable means, as a micrometer screw 31 and a Bowden wire connection 32, as described in my pending application Serial No. 787,460, filed
110 on the 30th day of August, 1913. The screw 31 is mounted in an aperture of the
115 motor-board, but on account of possible inaccuracies in the location of the aperture, or on account of distortion of the motor-board, the screw 31 may vary slightly from its true
120 predetermined position with respect to the frame 1 and the other parts of the apparatus. The Bowden wire 32 makes it possible for the screw 31 to be mounted on the
125 motor-board independently of the frame 1, the flexibility of the Bowden wire permitting the effecting of the adjustments, notwithstanding any minor inaccuracies or defects in the initial construction or assem-
130 blage of the parts.

Preferably the motor-casing is provided
115 with an end cap 33, removable for the purpose of inserting the motor within the casing, and said cap is provided on the interior face thereof (see Fig. 8) with a motor
120 shaft bearing 34, the other end of the shaft bearing the projecting worm 8, taking bearing in the opposite end wall of the motor casing. Preferably, suitable lubricating
125 means are provided for lubricating the several shaft bearings that are adjacent to the worms formed thereon. Thus, the shaft 11 has means provided for lubricating the
130 bearings 10 thereof, which means consists of a bore 35 (Fig. 3) formed in the frame of the machine, within which there is a

wick 36 saturated with a suitable lubricant, said bore being closed by a screw-plug 37. The wick extends inward to and through the bearing 10, and the said bearing is lubricated thereby, the lubricant also working its way down onto the worm 28 on the shaft 11. A similar bore 38 (Fig. 5) is formed in the end of the motor casing, whereby the bearing for the motor shaft carrying the worm 8 is lubricated, and also said worm. Similarly, there is formed in a lug 39 (Fig. 3) a bore closed by a screw-plug 40, whereby the bearing of the shaft 19 is lubricated, and with it the worm 22 meshing with the worm gear 23. This lubrication provides for the smooth and free operation of the several worms and their meshing worm gears, without undue wear, and the character of the lubricating device is such that it acts to lubricate the mechanism through a long period of time without attention from the operator.

It will be observed that there is but one shaft driven directly by the motor, viz., the driven shaft 11, and that the speed-governor, the speed-indicator and the start-and-stop mechanism are all controlled directly from said driven shaft, and that all the connections between the respective shafts are secured by worm gearing, and that the bearings for all of these shafts are formed in the integral motor frame. By this means, there is obtained simplicity and accuracy of construction at a minimum cost; and freedom from vibration of the parts, which occurs when ordinary spur gearing or belt connections are employed.

From the foregoing description, it will be clear that I have provided a unitary power apparatus comprising a rigid main frame, preferably an integral casting, on which the motor, the speed governor, the speed indicator and the start-and-stop mechanism are entirely supported, these parts being without rigid or fixed connections with the motor-board except through the said frame. Therefore, the unitary power apparatus can be separately constructed and assembled, and all of the parts made to properly engage and coöperate with each other without dependence being placed directly or indirectly on the motor-board. It will be noticed that I have combined with this unitary power apparatus coöperating devices mounted on the motor-board but without direct rigid connection to the power apparatus. These are the controlling device for the start-and-stop mechanism and the adjusting device for the governor, which are mounted on the motor-board and are provided with more or less flexible connections to the power apparatus; and the scale of the speed indicator, which is carried by the motor-board but is without direct connection with the parts of the speed indica-

tor proper. The absence of any direct rigid flexible connection between these devices and the power apparatus makes it unnecessary to attain absolute accuracy in the securing of any of these parts to the motor-board.

While the invention has been herein described with considerable particularity, it is to be understood that the invention is not limited to the specific construction described, since the same may be varied within the limits of the appended claims.

What is claimed is:—

1. In a talking machine, the combination of a unitary power apparatus comprising a motor, a motor-driven speed-governor, a motor-driven vertical shaft and a rigid frame with which all of the aforesaid parts have their only fixed connections, a horizontal thin sheet-metal motor-board from the under side of which the power apparatus is suspended, the motor-board having an aperture through which the vertical shaft extends with a clearance, a turn-table above the motor-board connected to and entirely supported by the upper part of the vertical shaft, an adjusting device for the governor mounted on the motor-board independently of the power apparatus, and a flexible connection between the adjusting device and the governor, the said connection serving on account of its flexibility to compensate for possible inaccuracies in the relative locations of the adjusting device and the power apparatus.

2. In a talking machine, the combination of a unitary power apparatus comprising a motor, a start-and-stop mechanism, a motor-driven vertical shaft and a rigid frame with which all of the aforesaid parts have their only fixed connections, a horizontal thin sheet-metal motor-board from the under side of which the power apparatus is suspended, the motor-board having an aperture through which the vertical shaft extends with a clearance, a turn-table above the motor-board connected to and entirely supported by the upper part of the vertical shaft, a controlling device for the start-and-stop mechanism mounted on the motor-board independently of the power apparatus, and a flexible connection between the controlling device and the start-and-stop mechanism, the said connection serving on account of its flexibility to compensate for possible inaccuracies in the relative locations of the controlling device and power apparatus.

3. In a talking machine, the combination of a unitary power apparatus comprising a motor, a motor-driven speed-governor, a start-and-stop mechanism, a motor-driven vertical shaft and a rigid frame with which all of the aforesaid parts have their only fixed connections, a horizontal thin sheet-

metal motor-board from the under side of which the power apparatus is suspended, the motor-board having an aperture through which the vertical shaft extends with a clearance, a turn-table above the motor-board connected to and entirely supported by the upper part of the vertical shaft, an adjusting device for the governor mounted on the motor-board independently of the power apparatus, a flexible connection between the adjusting device and the governor, a controlling device for the start-and-stop mechanism mounted on the motor-board independently of the power apparatus, and a flexible connection between the controlling device and the start-and-stop mechanism, the two said connections serving on account of their flexibility to compensate for possible inaccuracies in the relative locations of the adjusting device, the controlling device and the power apparatus.

4. In a talking machine, the combination of a unitary power apparatus comprising a motor, a motor-driven speed-governor, a motor-driven vertical shaft and a rigid frame with which all of the aforesaid parts have their only fixed connections, a horizontal thin sheet-metal motor-board from the under side of which the power apparatus is suspended, the motor-board having an aperture through which the vertical shaft extends with a clearance, a turn-table above the motor-board connected to and entirely supported by the upper part of the vertical shaft, an adjusting device for the governor mounted on the motor-board independently of the power apparatus, a flexible connection between the adjusting device and the governor, the said connection serving on account of its flexibility to compensate for possible inaccuracies in the relative locations of the adjusting device and the power apparatus, and a scale mounted on the motor-board independently of the power apparatus and coöperating with the pointer of the speed-indicator.

5. In a talking machine, the combination of a unitary power apparatus comprising a motor, a motor-driven speed-governor, a start-and-stop mechanism, a motor-driven vertical shaft and a rigid frame with which all of the aforesaid parts have their only fixed connections, a horizontal thin sheet-metal motor-board from the under side of which the power apparatus is suspended, the motor-board having an aperture through which the vertical shaft extends with a clearance, a turn-table above the motor-board connected to and entirely supported by the upper part of the vertical shaft, an adjusting device for the governor mounted on the motor-board independently of the power apparatus, a flexible connection between the

adjusting device and the governor, a controlling device for the start-and-stop mechanism mounted on the motor-board independently of the power apparatus, and a flexible connection between the controlling device and the start-and-stop mechanism, the two said connections serving on account of their flexibility to compensate for possible inaccuracies in the relative locations of the adjusting device, the controlling device and the power apparatus, and a scale mounted on the motor-board independently of the power apparatus and coöperating with the pointer of the speed-indicator.

6. In a talking machine, the combination of a centrally apertured horizontal motor-board, a rigid frame secured to the under side of the motor-board and comprising a motor-casing, a motor in said casing having its shaft horizontal, a speed-governor carried entirely by the frame and having a horizontal main shaft, a start-and-stop mechanism carried entirely by the frame and having a horizontal main shaft, a vertical shaft carried entirely by the frame and extending with a clearance through the motor-board aperture, three pairs of gears directly connecting the vertical shaft respectively with the motor shaft, the governor shaft and the start-and-stop shaft, and a turn-table above the motor-board connected to and entirely supported by the upper part of the vertical shaft.

7. In a talking machine, the combination of a centrally apertured horizontal motor-board, a rigid frame secured to the under side of the motor-board and comprising a motor-casing, a motor in said casing having its shaft horizontal, a speed-governor carried entirely by the frame and having a horizontal main shaft, a start-and-stop mechanism carried entirely by the frame and having a horizontal main shaft, a vertical shaft carried entirely by the frame and extending with a clearance through the motor-board aperture, three sets of worm-and-wheel gearing directly connecting the vertical shaft respectively with the motor, the governor shaft and the start-and-stop shaft, and a turn-table above the motor-board connected to and entirely supported by the upper part of the vertical shaft.

8. In a talking machine, the combination of a centrally apertured horizontal motor-board, an integrally cast frame secured to the under side of the motor-board and comprising a motor-casing, a motor in said casing having its shaft horizontal, a speed-governor carried entirely by the frame and having a horizontal main shaft, a start-and-stop mechanism carried entirely by the frame and having a horizontal main shaft, a vertical shaft carried entirely by the frame and extending with a clearance through the

motor-board aperture, three pairs of gears directly connecting the vertical shaft respectively with the motor shaft, the governor shaft and the start-and-stop shaft, and a turn-table above the motor-board connected to and entirely supported by the upper part of the vertical shaft.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN R. PETRIE,

JOHN S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE,
#1,184,938-----A. Fischer,
Patented-May 30th, 1916.
Filed-December 4th, 1911.

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TALKING MACHINE.
APPLICATION FILED DEC. 4, 1911.

1,184,938.

Patented May 30, 1916.

3 SHEETS—SHEET 1.

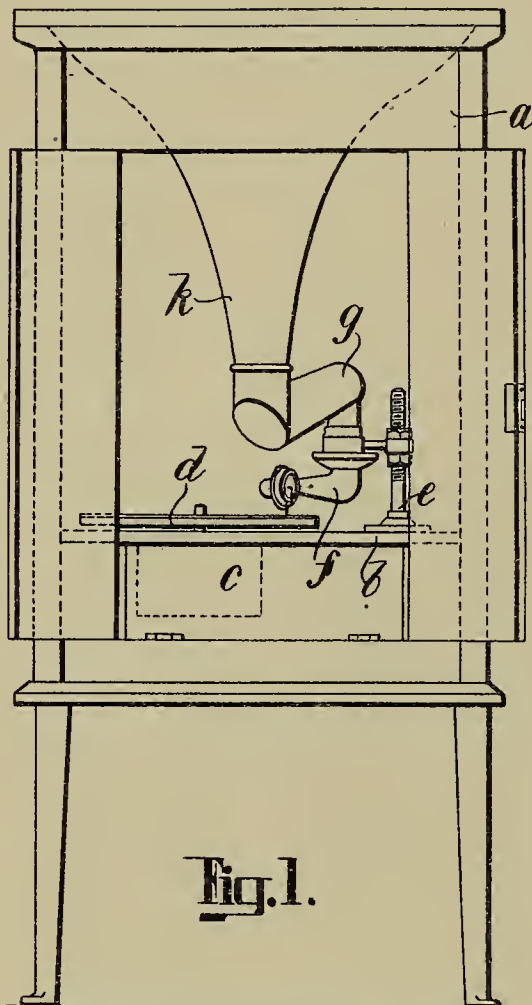


Fig. 1.

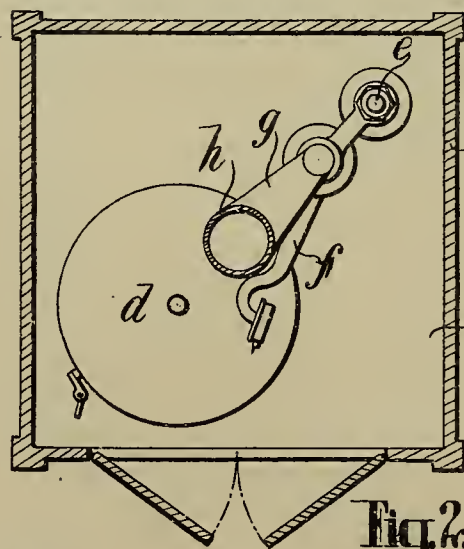


Fig. 2.

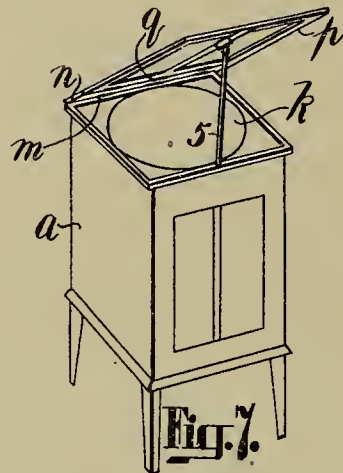


Fig. 7.

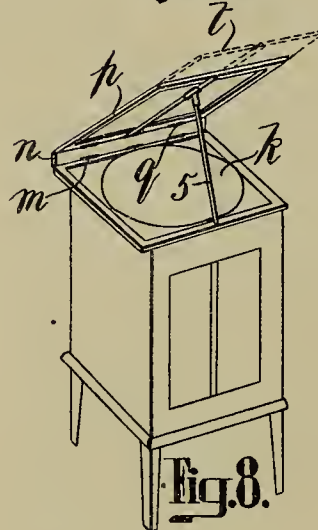


Fig. 8.

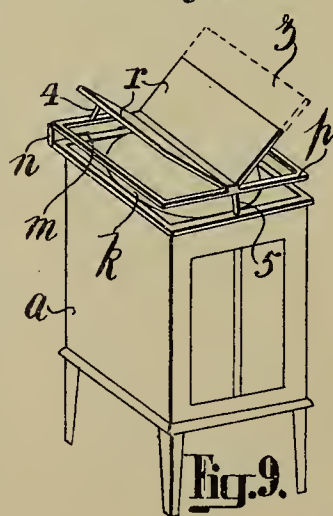


Fig. 9.

Witness:
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M. E. Burrell

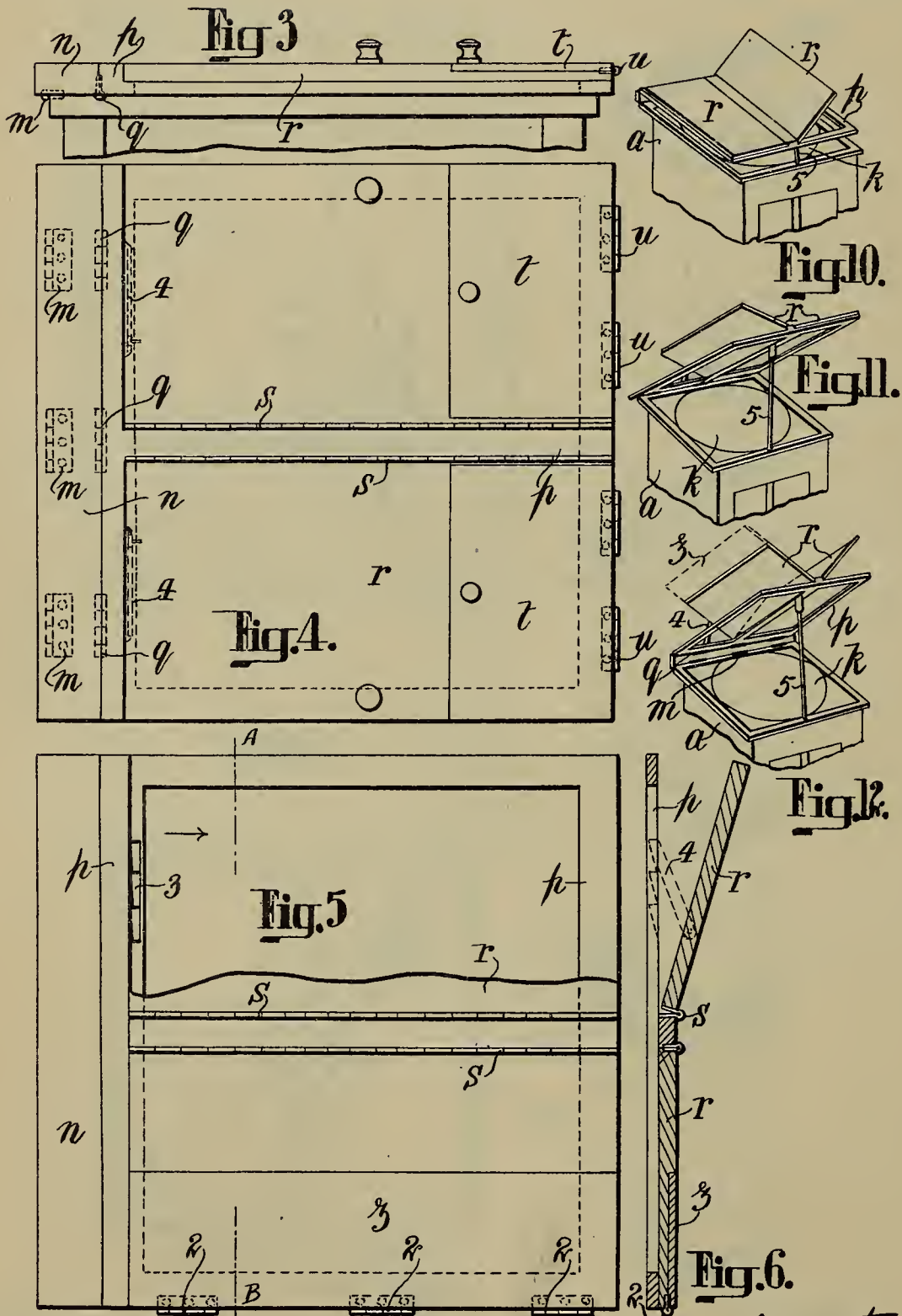
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TALKING MACHINE.
APPLICATION FILED DEC. 4, 1911.

1,184,938.

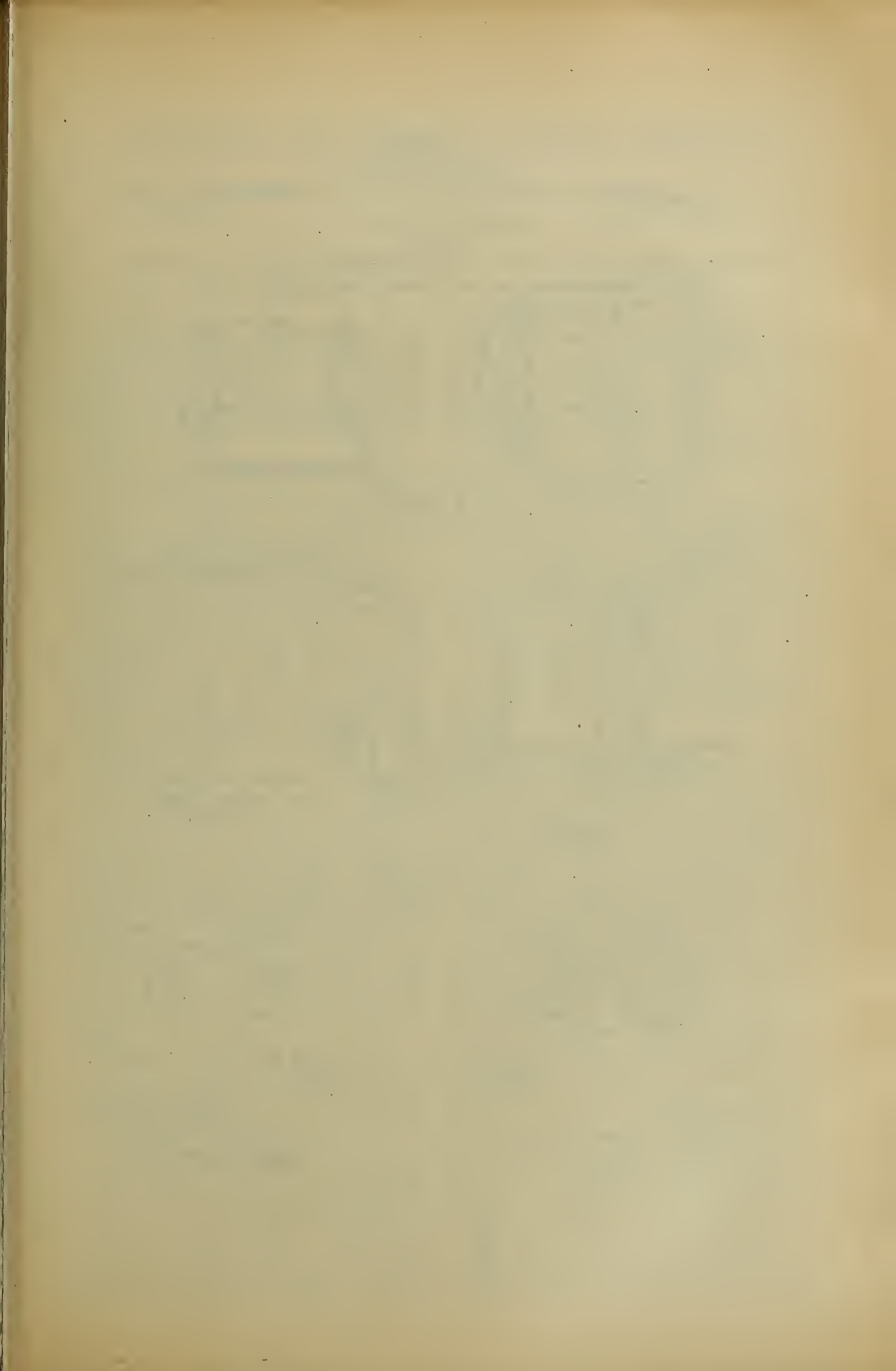
Patented May 30, 1916.

3 SHEETS—SHEET 2.



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1,184,938.

Patented May 30, 1916.
3 SHEETS—SHEET 3.

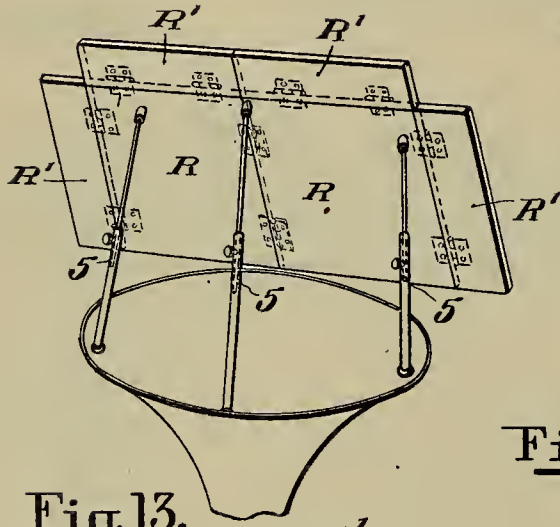


Fig. 13.

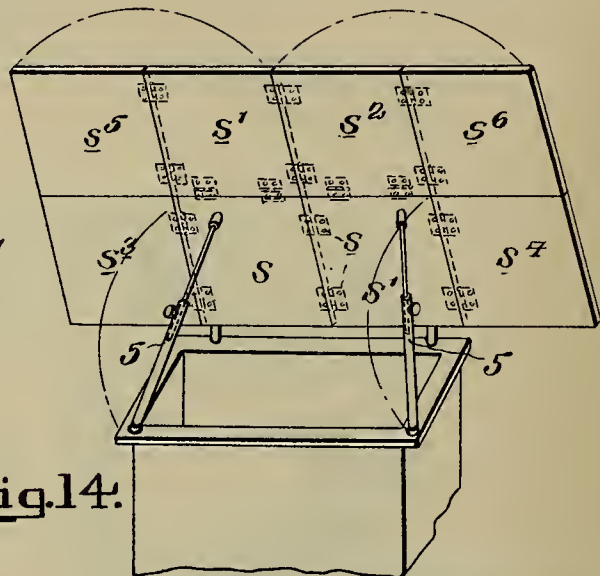


Fig. 14.

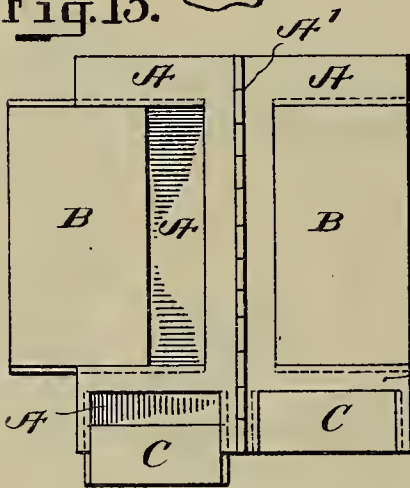


Fig. 15.

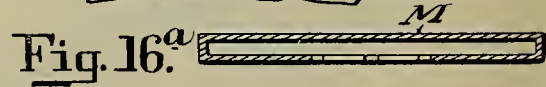


Fig. 16a.

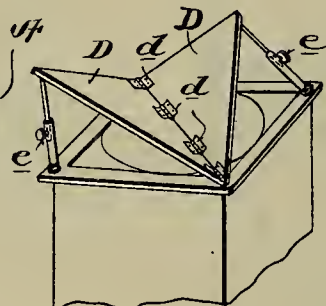


Fig. 17.

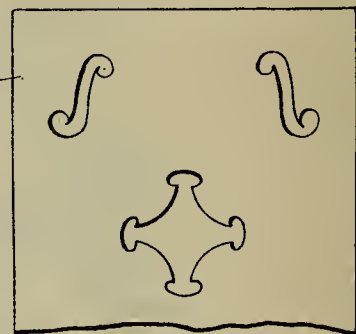


Fig. 16.

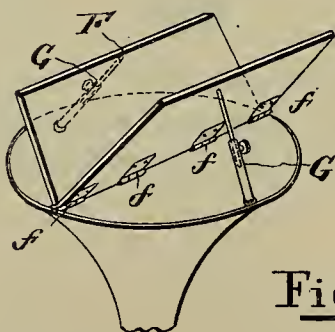


Fig. 18.

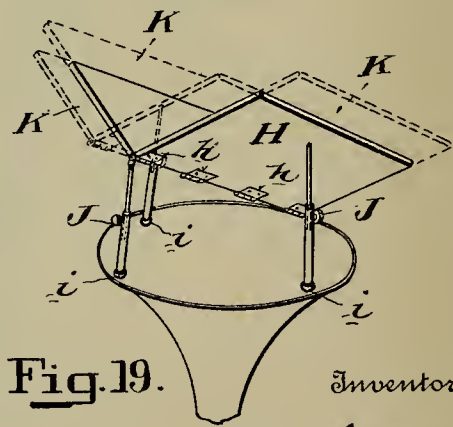


Fig. 19.

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C. F. Early.

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Baldwin Wright

UNITED STATES PATENT OFFICE.

ALEX FISCHER, OF KENSINGTON, LONDON, ENGLAND.

TALKING-MACHINE.

1,184,938.

Specification of Letters Patent.

Patented May 30, 1916.

Application filed December 4, 1911. Serial No. 663,880.

To all whom it may concern:

Be it known that I, ALEX FISCHER, a subject of the King of England, residing at 8 Maclise road, Kensington, London, England, have invented certain new and useful Improvements in and Relating to Talking-Machines, of which the following is a specification.

This invention relates to talking machines, and refers more particularly to improvements in talking machines of the cabinet type in which the top or cover or the doors of the cabinet, coming at the mouth of the trumpet are used as reflecting or directing surfaces for the sound.

With machines of the cabinet type it has already been proposed to provide a hinged cover coming above the mouth of a vertical trumpet or hinged doors at the side of the cabinet and at the mouth of the trumpet, which cover or doors may be used for reflecting the sound. The cover or each door, has, however, been made in one piece so that it has been possible to reflect the sound waves in one direction only, for one position of the door or cover.

My present invention refers to a construction, in which the top or door of the cabinet, while being so formed as to be capable of being turned into various positions, is itself furnished with one or more secondary hinged or sliding flaps or strips, forming a reflecting surface or surfaces which can be brought into a large number of different positions and retained in such positions independently of one another when desired, in order that the sound may be reflected either in one direction only, as has already been the case or in various directions at the same time and in various ways to suit requirements.

Where a cabinet is not used, I provide a reflecting device adapted to be mounted at the mouth of the trumpet of a talking machine, which reflecting device is provided with a secondary hinged or sliding flap or flaps or strips before mentioned.

In one way of carrying out my invention I provide a cabinet which is preferably square in plan. Toward one corner on the bottom board I mount a turntable, the motor being suitably located for this purpose beneath the bottom board. Toward the diagonally opposite corner I mount the bracket for holding the tone arm. Leading from the tone arm is a bent tube, which is so

bent that it leads to an orifice coming at the center of the cabinet where it opens into a vertically disposed trumpet, which may be suitably attached to the casing of the cabinet. The trumpet extends to the top of the cabinet, coming beneath the lid or cover. This lid or cover is hinged so that it can be turned up to and fixed at any angle desired above the trumpet, suitable means being provided for keeping it in position.

The cover is made in two or more pieces which are hinged with respect to each other or which slide with respect thereto in such a way that they may be brought into and retained in position so that the whole constitutes one or more reflecting surfaces, and the reflecting surfaces may be simple reflecting surfaces or form resonating chambers of any desired type with holes in the sides.

In order that this invention may be better understood, I will now proceed to describe the same with reference to the drawing accompanying this specification in which:—

Figure 1 is a front elevation of the machine with the doors open; Fig. 2 is a sectional plan; Fig. 3 is an enlarged view of the top of the cabinet; Fig. 4 is a plan view of same. Fig. 5 is a similar view to Fig. 4 of a slightly modified form. Fig. 6 is a sectional view on the line A—B of Fig. 5 looking in the direction of the arrow. Figs. 7 to 12 are partly diagrammatic views of the cabinet showing different kinds of covers, and also showing the cover in some of the different positions it can be made to assume. Fig. 13 illustrates how a reflector with adjustable flaps may be applied adjustably directly to the mouth of the horn. Fig. 14 shows another form of the reflector applied adjustably to the top of a cabinet. Fig. 15 is a plan view of still another form of reflector with sliding flaps. Fig. 16 is a plan view of a portion of a reflector provided with a resonating chamber. Fig. 16^a shows a transverse section thereof. Fig. 17 is a perspective view showing still another way of applying reflectors to the top of a cabinet in such manner that they may be adjusted relatively to the mouth of the horn and relatively to each other. Figs. 18 and 19 show other ways of applying reflectors to the mouth of the horn of a talking machine.

The cabinet *a* which is preferably square in plan is provided with a board *b* beneath which is located the motor *c* in such a way

that the turntable *d* comes toward one corner. Toward the diagonally opposite corner is mounted the bracket *e* for holding the tone arm *f*. Leading from the tone arm *f* is a bent tube *g* which is so bent that it leads to an orifice *h* coming at the center of the cabinet *a* where it bends into a vertically disposed trumpet *k*, which may be attached to the cabinet *a*. It will be seen that the trumpet extends to the top of the cabinet *a* coming beneath the lid or cover. This lid or cover is hinged to the cabinet at *m*.

The cover in the particular case under consideration is made as follows:—*n* is a strip extending across the back of the cabinet to which strip is hinged a framework *p* by means of hinges *q*. This framework has hinged thereto two flaps *r* by means of hinges *s*. The frame *p* supports the flaps *r* when in the closed position. *t* are two other flaps which are hinged at *u* to the front portion of the flaps *r*. These flaps can be turned outward upon the hinges *u*. At Figs. 5 and 6 a form of the invention is shown in which other flaps *z* are provided hinged at 2 to the side flaps *r*. The hinged flap *z* is only shown attached to one of the flaps *r* but flaps *z* may of course be provided for each of the flaps *r*. The frame *p* is provided with notches 3 at the sides and the flaps are provided with rods 4 the ends of which are adapted to take into one of the notches 3 so that the flap *r* can be held open at the required angle.

Referring to Figs. 7 to 12, which show some of the different positions which the cover can be made to assume, at Fig. 7 the cover is shown turned up about the hinges *m* and held in position by means of a rod 5. At Fig. 8 the strip *n* is turned up into a vertical position about the hinges *m* and then the cover is turned about the hinges *q* and held in position by the rod 5 which is provided with an extensible end for this purpose. In this figure the flaps *t* are shown dotted in the turned up position.

In Fig. 9 the piece *n* is turned up into the vertical position about the hinges *m* and the frame *p* is held in the horizontal position by means of a block or rod 5 and then the flaps *r* are turned up into a raised position and retained therein by means of the rod 4 engaging in the notches 3. In this figure one of the side flaps is shown with the extension piece *z* dotted in position. At Fig. 10 is an arrangement similar to that described with reference to Fig. 9, but in this case only one of the flaps is turned upward the other one being left upon the frame *p*. At Fig. 11, the cover is turned about the hinges *m* and held in position by the rod 5 and then one of the flaps *r* is turned up and held in position by the rod 4 resting in one of the notches 3. At Fig. 12 the strip *n* is turned into the vertical position about the hinges *m* the frame *p* is then turned about the hinges

q and secured in the upper position by the extended rod 5, and then both of the flaps *r* are turned into the upward position and retained in position by means of the rods 4 resting in the catches 3. In this figure one of the extensions *z* is shown.

It will be understood that the methods of arranging the cover described with reference to Figs. 7 to 12 are merely representative as with the same construction of cover other combinations may be made, for instance, both the flaps *r* may be turned up and both the flaps *t* turned out as also both the flaps *z* and many other combinations may be made to suit requirements.

Although I have described and shown the second flaps as hinged with respect to the principal flaps I may in some cases make them slide with respect thereto either at the front or the sides. This feature of the invention is shown in Fig. 15 in which A, A, indicate the main reflecting sections which are hinged together at A' so that they may be opened to any desired extent and placed at any desired angle relatively to each other or to the mouth of the horn. Each section carries a sliding section or flap B and another sliding flap C. The reflector shown in Fig. 15 as a whole can be suitably mounted over a horn in the manner before described and great variety in intensity, volume and quality of sound, as well as in the direction of movement of the sound waves, can be obtained. The flaps may be made of any suitable material and they may be made so as to be detachable and interchangeable.

Although I have described two flaps hinged to the cover I may provide more than two hinged or sliding flaps and I may arrange them to turn up or draw out in any suitable direction. I may also hinge the two flaps forming the reflecting surfaces in such a way that the hinge lies in a diagonal across the top of the cabinet or in any other desired direction. This is illustrated in Fig. 17 where the reflectors D, D are hinged to the top of the cabinet at *d* in a line extending diagonally across the cabinet and the reflectors may be held at any desired angle relatively to the mouth of the horn and at any desired angle relatively to each other by means of the adjustable rods *e*.

Again although my invention relates more especially to machines of the cabinet type I may apply it to trumpets or cheap machines. In this case the trumpet is directed vertically upward and at or over the top thereof I preferably provide a rod or its equivalent which may be hinged and which may extend diametrically across the top of the trumpet and I hinge a flap or flaps thereto which flap or flaps can be turned up into and retained in a suitable position for acting as reflecting surfaces. Other secondary hinged or sliding flaps may be added in connection

with the principal flaps. This feature of the invention is shown in Figs. 18 and 19. In Fig. 18 reflectors F are hinged to the horn at *f* and are supported by adjustable rods G also connected with the horn. In Fig. 19 the reflectors H are hinged to each other at *h* and they are hinged to the horn at *i*. The reflectors may be held in any desired position on the horn and given any desired angle by means of the adjusting devices J. In Fig. 19 the reflectors H are provided with adjustable flaps K which are shown extended by dotted lines. One or more of each set of reflectors may be formed with resonating chambers, that is, either or all of the sections may be made hollow as indicated at M in Figs. 16 and 16^a. In Fig. 13 the primary reflector is made in two parts R which may be hinged together, and secondary reflectors or flaps R' are hinged to the top and side edges thereof. In Fig. 14 the primary reflectors S, S' are hinged together at *s* and have hinged to their top edges flaps *s'*, *s*² and to their side edges flaps *s*³, *s*⁴. The flaps *s'*, *s*² also have flaps *s*⁵, *s*⁶ hinged to them. I have shown hinges in a conventional way. It will be understood that hinges of proper form to permit of the folding of the flaps and sections are to be employed, and that suitable adjustable supports wherever necessary are used.

In the claims where I specify a flap it will be understood of course that I also contemplate employing a plurality of flaps.

What I claim as my invention and desire

to secure by Letters Patent of the United States of America is:—

1. The combination with the trumpet of a talking machine, of a primary sound deflector mounted beyond the outer end of the trumpet for receiving the sound waves emanating therefrom and reflecting them outward, said reflector being adjustable to vary the angle of reflection and carrying a sound reflecting flap adjustably mounted whereby it may be supported in various positions to vary the extent of the reflecting surface, and means for supporting the primary reflector at various angles relatively to the axis of the trumpet.

2. The combination with the trumpet of a talking machine, of a primary sound reflector mounted beyond the outer end of the trumpet for receiving the sound waves emanating therefrom and reflecting them outward, comprising a plurality of sections connected together and hinged to a support which sections are adjustably mounted whereby they may be supported in various positions on the primary reflector to vary the marginal extent of the reflecting surface, and means for adjustably supporting the several connected sections at various angles relatively to the axis of the trumpet.

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

ALEX FISCHER.

Witnesses:

L. SIMMONDS,

A. BROWNE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH FOR DOLLS OR OTHER
TOYS,

#1,185,001-----H. Ringel,
Patented-May 30th, 1916.
Filed-April 2nd, 1913.

H. RINGEL.
 PHONOGRAPH FOR DOLLS OR OTHER TOYS.
 APPLICATION FILED APR. 2, 1913.

1,185,001.

Patented May 30, 1916.

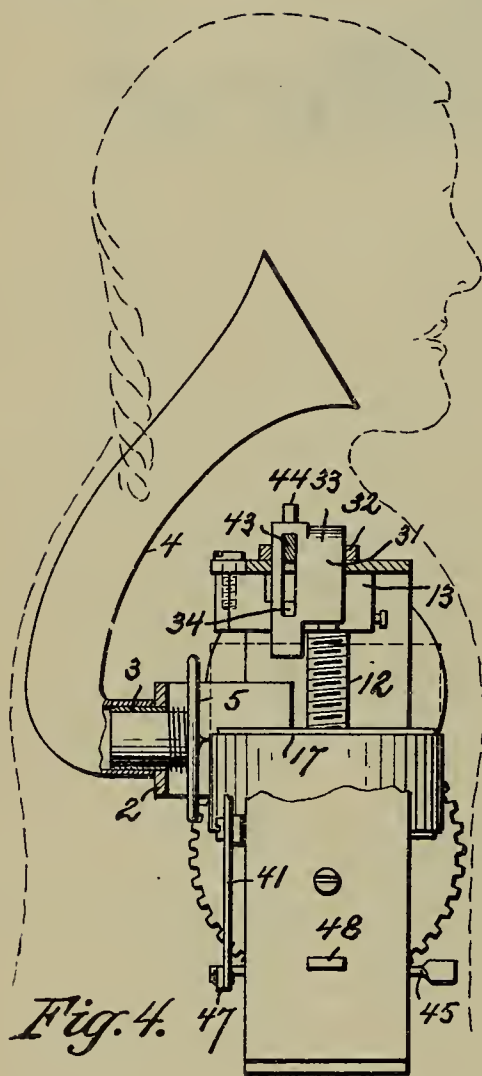


Fig. 4.

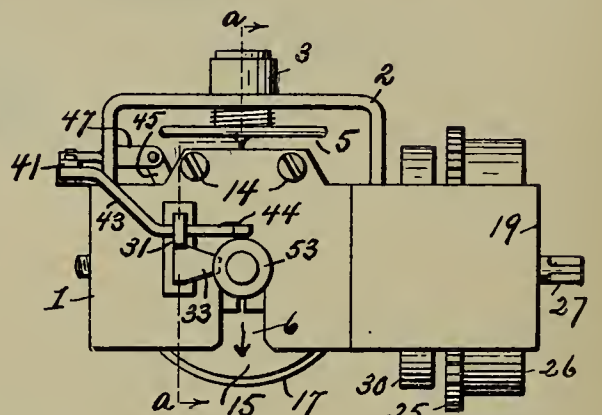


Fig. 2.

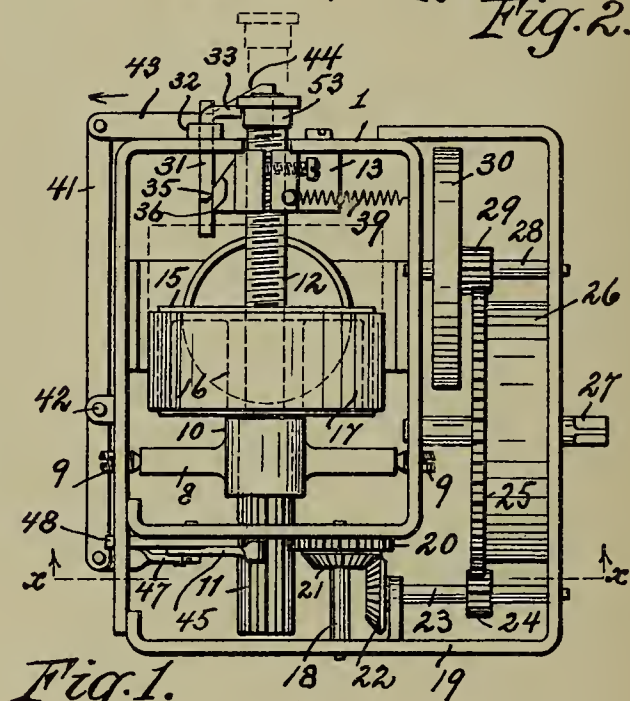


Fig. 1.

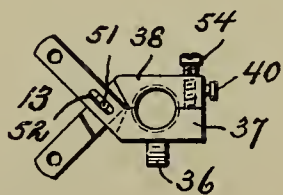


Fig. 5.

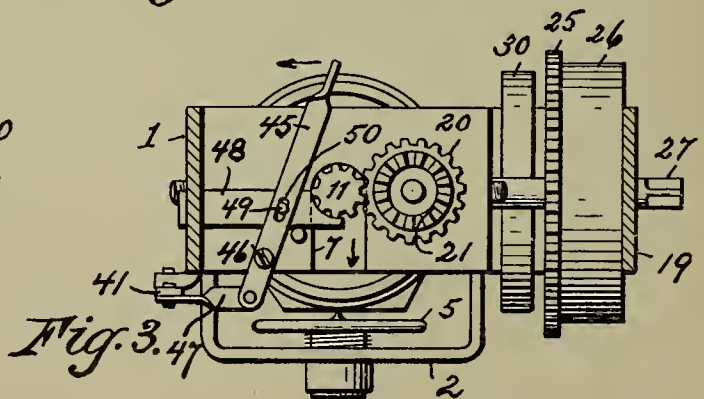


Fig. 3.

WITNESSES:
 Clifford A. Alliston.
 Dorothy K. Pichman

INVENTOR
 Herman Ringel
 by Fred C. Fischer.
 ATTORNEYS

UNITED STATES PATENT OFFICE.

HERMAN RINGEL, OF NEWARK, NEW JERSEY.

PHONOGRAPH FOR DOLLS OR OTHER TOYS.

1,185,001.

Specification of Letters Patent.

Patented May 30, 1916.

Application filed April 2, 1913. Serial No. 758,304.

To all whom it may concern:

Be it known that I, HERMAN RINGEL, a citizen of the United States, residing in the city of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs for Dolls or other Toys, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it pertains to make, construct, and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, forming a part of this specification.

My invention relates more especially to phonographs designed to be placed in dolls or other toys, whereby they can be constructed in a manner so simple and inexpensive, as to be adapted to almost universal use in the production of articulate sounds, and especially short sentences or phrases of everyday speech.

The object I have in view is to produce a simple, inexpensive and efficient construction, and my invention consists in the various novel devices and combinations as hereinafter explained and pointed out by the claims.

Another object is to provide means for readily removing the record from the machine.

Another object of my invention is to provide means to return the record back to the position of starting, and at the same time, disengaging the feed screw from the feed nut.

In the accompanying drawings, Figure 1 represents a front elevation of my improved phonograph. Fig. 2 represents a plan view of the same. Fig. 3 represents a transverse section taken on lines $x-x$ of Fig. 1, looking in the direction indicated by the arrows. Fig. 4 represents in partial section, a side elevation of my improved phonograph taken on lines $a-a$ of Fig. 2, looking in the direction indicated by the arrows, the phonograph being shown in position in a dotted view of a doll; and Fig. 5 represents a plan view of the split-nut used in connection with my improved phonograph.

Similar numerals of reference refer to like parts throughout the specification and drawings.

In the drawings, 1 represents a metal strap bent to form a rectangular support-

ing frame, to one side of which is secured a strap 2, with a tubular extension 3 for the reception of the horn 4 and reproducer 5. The top of the rectangular supporting frame 1 at its front end is slotted, as at 6, and the bottom thereof, at its rear or opposite end, is slotted as at 7, the said slots providing means for the removal of the operating shaft and sound record, which will be more fully hereinafter described.

A supporting frame 8 extends across between the side piece of the frame 1, both ends of which set against centering points 9. This supporting frame is provided with a centrally-arranged tubular extension 10, through which a pinion 11 passes. This pinion forms a part of the screw-threaded operating shaft 12, one end of which passes through the split-nut 13, which is secured to the under side of the rectangular supporting frame 1 in any convenient manner, preferably by means of screws 14.

Upon the screw-threaded operating shaft 12 is mounted a mandrel 15, provided with an interiorly-arranged bearing 16, which when the mandrel is in the position indicated in Fig. 1, bears against the tubular extension 10 of the supporting bracket 8. The mandrel 15 carries the sound record 17. The mandrel 15 being fast to the screw-threaded operating shaft 12, and held thereon by the interiorly-arranged bearing 16, the outer end of which is supported upon the circularly-arranged tubular extension 10 of the pivotally arranged supporting bracket 8, and through which the pinion 11 of the operating shaft 12 passes, it will be seen that the operating shaft is supported in a vertical position, the upper screw-threaded end of which passes through and engages with the split-nut 13, which is secured to the under side of the supporting bracket 1.

18 represents a shaft, one end of which is secured in the lower portion of the supporting frame 1, and the other end of which is secured in a supplemental frame 19.

20 represents a gear wheel secured to the shaft 18 and which meshes with the pinion 11, and which derives its motion from the bevel gears 21 and 22, the bevel gear 22 being driven from a shaft 23, upon which is mounted a gear wheel 24, which meshes with a gear wheel 25 secured to the spring motor 26. The motor 26 is mounted upon the operating shaft 27.

A stud 28 extends across between the side pieces of the frame 1, and the supplemental frame 19, which carries a gear wheel 29, which meshes with the gear wheel 25. A balance wheel 30 is mounted upon the stud 28 to steady the revolving movement of the operating shaft 12.

The means employed for returning the record to the position of starting and at the same time, disengaging the feed screw 12 from the feed nut 13, consists essentially of a loosely mounted sliding bar 31 mounted in the upper portion of the supporting frame 1, said sliding bar 31 being supported in a bushing 32 secured to said frame, the upper end of the bar being provided with a rectangular extension 33 at one side, and the other side being provided with a slot 34, to be hereinafter described. This sliding bar is provided with a rounded edge 35 designed to engage with a beveled projection 36 formed integral with one member of the split-nut 37.

From an inspection of Fig. 2 of the drawings, it will be seen that the position of the sliding bar 31 is such as to tend to keep the members 37 and 38 of the split-nut together. A spiral spring 39, one end of which is secured to the member 38 of the split-nut by means of a stud 40, and the other end of said spring 39 being secured in any convenient manner to one of the longitudinal sides of the frame 1, tends to open the split-nut, so that the operating shaft 12 becomes disengaged therefrom, when the rounded surface 35 of the sliding bar 31 engages with the beveled surface 36 of the member 37 of the split-nut 13. This takes place when the mandrel 15 assumes the position indicated in dotted lines in Fig. 1, in which case the sliding bar will have been moved up sufficiently for the rounded surface of the sliding bar to engage with the beveled surface 36 of the nut member 37, thereby permitting the spring 39 to exert its force in separating the members 37 and 38 to permit the mandrel to drop back upon the extension 10 of the frame 8 and assume its original position of starting.

To provide for the removal of the sound record 17, from the feed nut 13 and the supporting frame 1, I pivot a lever 41 to the side of the supporting frame 1 at 42, said lever having pivoted at its upper end a lever 43, which passes through the slot 34 of the sliding bar 31, and is provided with a beveled extension 44, so that when the lever 43 is moved in the direction indicated by the arrow, said beveled extension will engage with the upper edge of the slot 34, thereby raising the sliding bar 31 sufficiently to cause the split feed-nut 13 to open and to permit the feed nut to be disengaged from the feed screw, so that the feed screw can be swung out of the slot 6 in the top

of the supporting frame 1, in the direction indicated by the arrow. A cap 53 secured to the upper end of the operating shaft 12 is designed to have engagement with the rectangular extension 33 formed on the sliding bar 31, so that when the record is brought back to the position of starting, said cap 53 will contact with the said extension 33 in order to facilitate the return of the sliding bar 31 to its normal position, as indicated in Fig. 1 of the drawings.

The levers 41 and 43 are operated by means of the lever 45, which is pivoted at 46 to the under side of the supporting frame 1, as clearly indicated in Fig. 3 of the drawings. The end of the lever 45 is connected to the end of the lever 41 by means of a short link 47. The concaved end of the loosely mounted sliding bar 48, provided with a stud 49, which engages with the slot 50 in the lever 45, is moved in and out of engagement with the pinion 11 of the operating shaft, at the same time that the sliding bar 31 is raised, thereby permitting the operating shaft to be swung around on the supporting frame 8 and out of engagement with the frame.

Shifting the sliding bar 48 in the manner described, enables the pinion 11 to be swung out of the slot 7 in the lower portion of the supporting frame 1, in the direction indicated by the arrow. The member 38 of the split-nut is provided with a pin 51, which engages with a slot 52 in the member 37, in order to give the desired movement to the two members of the split feed-nut 13.

A nut 54 having screw-threaded engagement with the member 38 of the split-nut 13 engages with the member 37 of the split-nut, in order to properly adjust said members.

The construction of the phonograph described in this specification, was devised for use in a doll or other image; but, as will be readily understood, the same apparatus may be used in a box or case of any form desired, and many variations in the specific form and construction of the several parts may be made without departing from the spirit of the invention.

I claim:

1. In a phonograph, the combination with a supporting frame, of a vertically moving operating shaft, a record mandrel rigidly secured to said shaft and rotating therewith, a stationary split feed-nut located in the supporting frame for advancing the operating shaft, and means coöperating with the feed nut slidably mounted in the upper end of the supporting frame adapted to be acted upon by the side of the mandrel to permit the disengagement of the operating shaft from the split feed-nut while the record is being brought back to the position of starting.

2. In a phonograph, the combination with a supporting frame, of a split feed-nut provided with a beveled extension located in one side of said supporting frame, a vertically moving operating shaft, a record mandrel rigidly secured to said shaft and rotating therewith, and means slidably mounted in the upper end of the supporting frame adapted to be acted upon by the side of the mandrel, and also adapted to act upon the beveled extension of said feed-nut to permit the disengagement of the operating shaft from the split feed-nut while the record is being brought back to the position of starting.

3. In a phonograph, the combination with a supporting frame, of a vertically moving operating shaft, a record mandrel rigidly secured to said shaft and rotating therewith, a stationary split feed-nut located in the supporting frame for advancing the operating shaft, and means coöperating with the feed-nut slidably mounted in the upper end of the supporting frame adapted to be acted upon by the side of the mandrel to permit the disengagement of the operating shaft from the split feed-nut while the record is being brought back to the position of starting and means pivotally secured to the supporting frame for permitting the feed nut to be disengaged from the operating shaft, so that said shaft can be swung out of the supporting frame, said means having

engagement with the said slidable means mounted in the upper end of the supporting frame and with the lower end of the operating shaft. 35

4. In a phonograph, the combination with a supporting frame, of a split feed-nut provided with a beveled extension located in one side of said supporting frame, a vertically moving operating shaft, a record mandrel rigidly secured to said shaft and rotating therewith, means slidably mounted in the upper end of the supporting frame adapted to be acted upon by the side of the mandrel, and also adapted to act upon the beveled extension of said feed-nut to permit the disengagement of the operating shaft from the split feed-nut while the record is being brought back to the position of starting and means pivotally secured to the supporting frame for permitting the feed nut to be disengaged from the operating shaft, so that said shaft can be swung out of the supporting frame, said means having engagement with the said slidable means mounted in the upper end of the supporting frame and with the lower end of the operating shaft. 40 45 50 55 60

This specification signed and witnessed this first day of April, 1913.

HERMAN RINGEL.

Witnesses:

FRED'K C. FISCHER,

CLIFFORD A. ALLISTON.

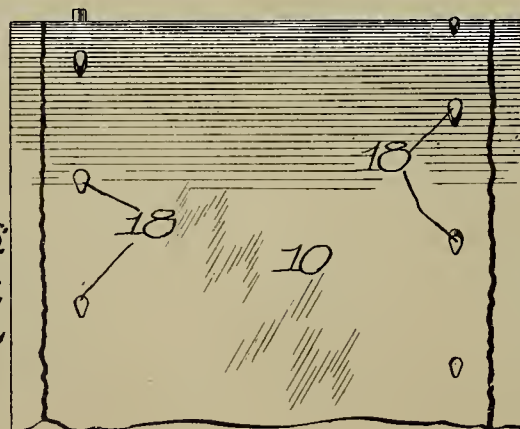
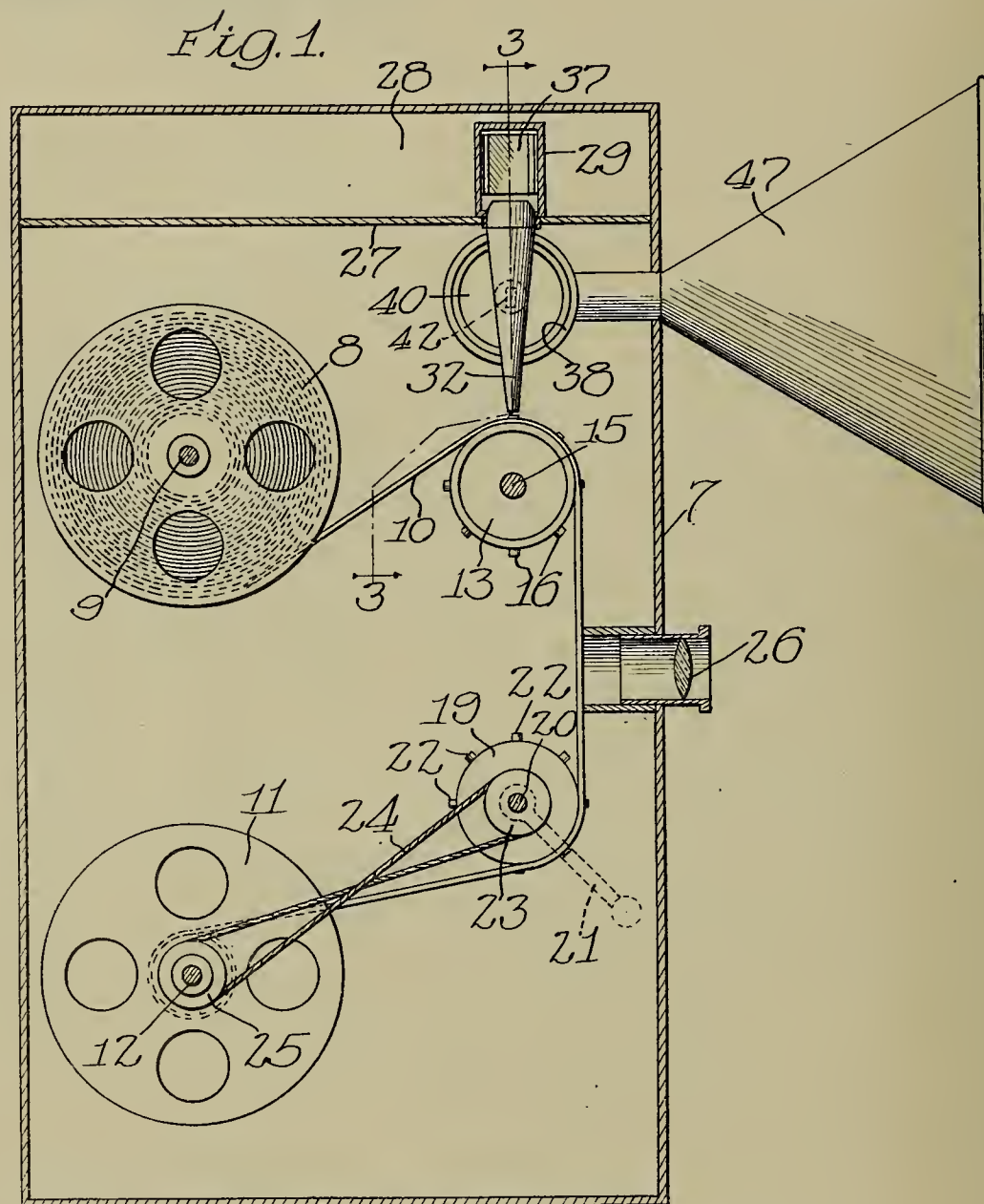
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

METHOD OF MAKING PHONOGRAPHIC RECORDS,
#1,185,056-----H. B. Byron,
Patented-May 30th, 1916.
Filed-February 19th, 1912.

H. B. BYRON.
METHOD OF MAKING PHONOGRAPHIC RECORDS.
APPLICATION FILED FEB. 19, 1912.

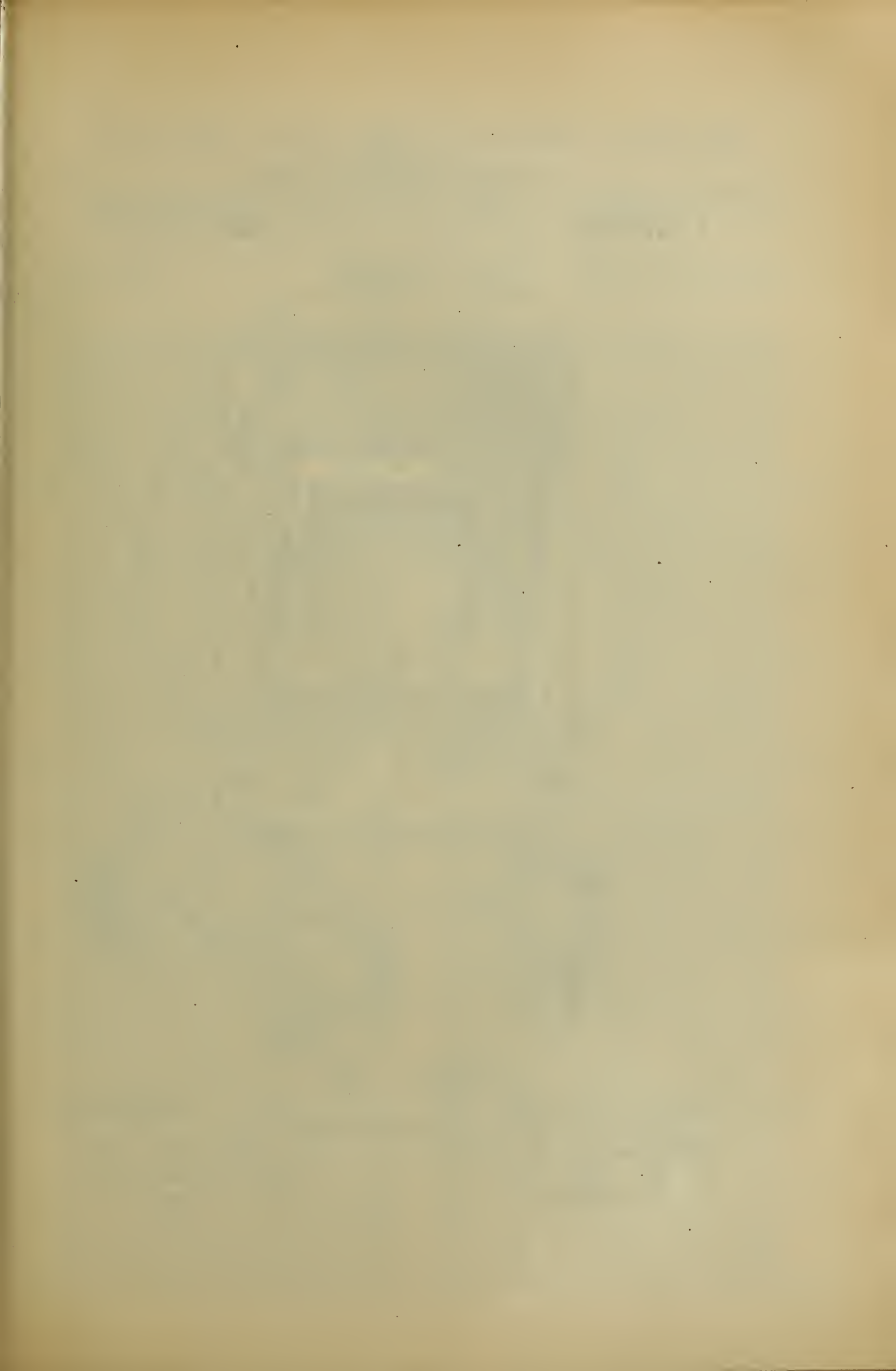
1,185,056.

Patented May 30, 1916.
2 SHEETS—SHEET 1.



Witnesses:
H. K. Marus Jr.
R. Burkhardt.

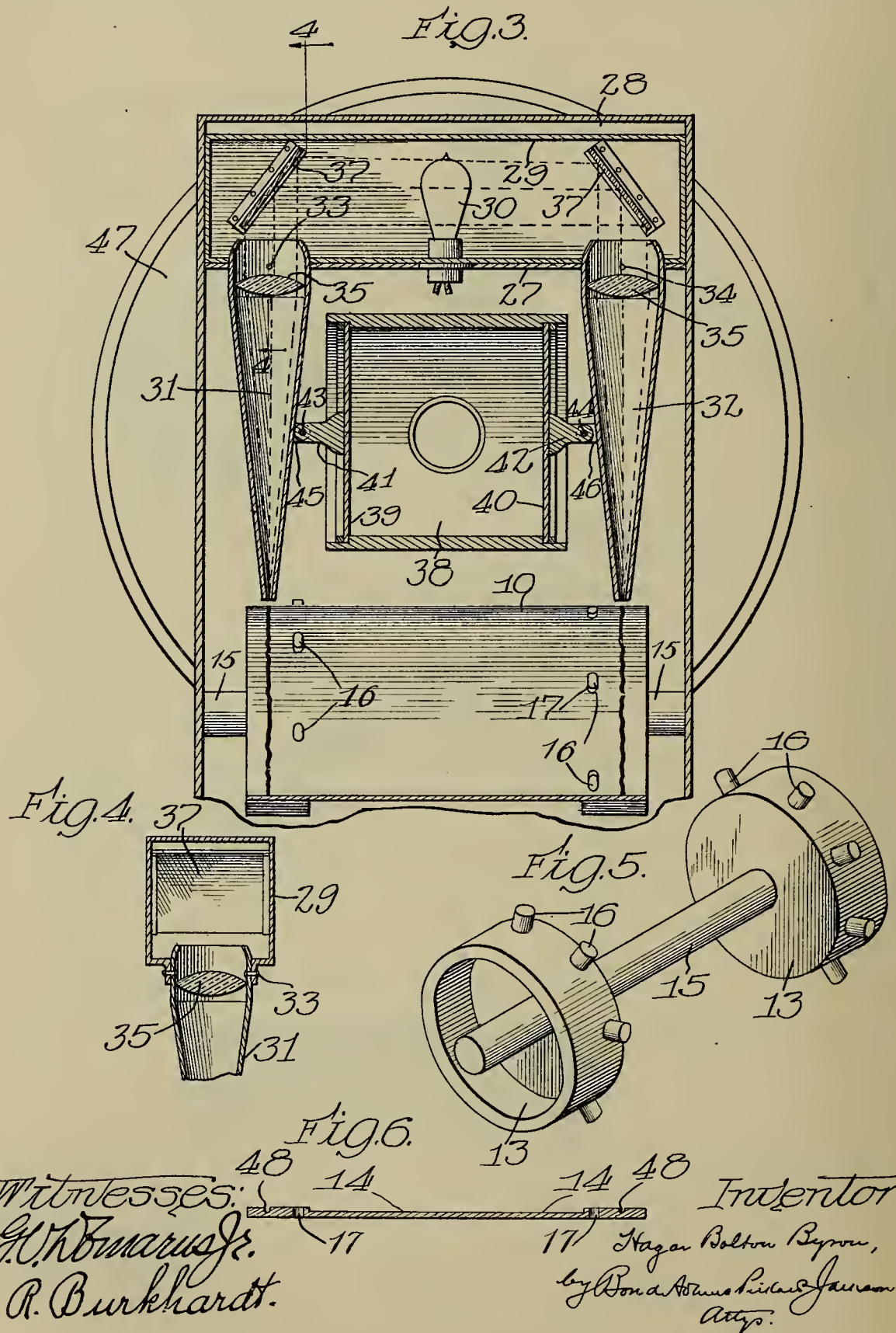
Inventor:
Hagar Bolton Byron,
by Bond Adams Pittsford & Co.
Attys.



H. B. BYRON.
METHOD OF MAKING PHONOGRAPHIC RECORDS.
APPLICATION FILED FEB. 19, 1912.

1,185,056.

Patented May 30, 1916.
2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

HAGAR BOLTON BYRON, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, OF ONE-THIRD TO A. H. ADAMS, ADA E. PICKARD, AND J. L. JACKSON, OF CHICAGO, ILLINOIS.

METHOD OF MAKING PHONOGRAPHIC RECORDS.

1,185,056.

Specification of Letters Patent.

Patented May 30, 1916.

Application filed February 19, 1912. Serial No. 678,610.

To all whom it may concern:

Be it known that I, HAGAR BOLTON BYRON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and Improved Method of Making Phonographic Records, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to the art of making phonographic records for the reproduction of sounds, and has for its object to provide a new and improved method by which continuous records of any desired length may be made having one or more grooves corresponding with the sound waves to be reproduced; also to provide for making such sound grooves by photography and thus make practicable the simultaneous making of sound records and photographic records on the same medium, such as a flexible film, thereby insuring perfect synchronism. I accomplish these objects as illustrated in the drawings and as hereinafter described.

What I regard as new is set forth in the claims.

In the accompanying drawings,—Figure 1 is a vertical sectional view showing one form of apparatus that may be conveniently employed for photographing sound waves upon a continuous film and at the same time photographing views thereon: Fig. 2 is an enlarged detail, showing the face view of a portion of a combined phonographic and kinetographic record as made by such apparatus: Fig. 3 is an enlarged detail, being a partial vertical cross-section on line 3—3 of Fig. 1; Fig. 4 is an enlarged detail, being a partial vertical section on line 4—4 of Fig. 3; Fig. 5 is a perspective view of the guide wheels and shaft; and Fig. 6 is a cross-section of the finished record.

My invention contemplates the exposure of a sensitive ribbon or film to the action of light so that when developed it will form a negative of the sounds to be reproduced, the latter being manifested in the form of lateral wave lines corresponding to the sound waves accompanying the exposure. In the best form of my invention, two sound wave lines are produced near the opposite margins of the film, which in the embodiment illustrated are thickened, but my invention is not restricted to making two of such wave lines, as one will suffice, although the results will

not be as satisfactory as if two of such wave lines are made. By providing two sound wave lines one will be apt to make up for any deficiency in the other, so that uniformly good results will be obtained, and moreover, the life of the film is prolonged, as the wear upon each sound wave line is not as great, since they coöperate in sound reproduction. After the development of the film in the usual way, a positive film is produced from it, in which, of course, the lights and shadows are reversed, the sound wave lines being unaffected by the light. In making this positive film, when a combined kinetographic and phonographic record is to be produced, I employ a film the intermediate portion of which is sensitized in the same way as the ordinary photographic film, while its margins are coated with a soluble composition capable of being hardened or rendered water-insoluble by the action of light, such as an emulsion composed of one-fifth gelatin, one-fifth bichromate of potash, and three-fifths gum arabic. These proportions may, however, be varied, and instead of the composition mentioned any other composition suitable for the purpose may be employed. This film having the marginal zones described is exposed to light under the negative film in the usual way, and is then developed, fixed and washed according to the procedure usually followed with kinetographic films. Those portions of the marginal zones which are exposed to light become insoluble, but the portions underlying the negative sound wave lines, being unaffected by the light, remain soluble in water and are consequently dissolved and washed away in the finishing of the film, as described, thereby leaving channels or grooves which correspond exactly with the sinuosities of the negative sound wave lines and are capable of sound reproduction by the use of any suitable phonographic reproducing apparatus operating by lateral vibration, such as that used in the instrument known as the "gramophone", or other similar devices operating on disk records. These thickened marginal portions of the film also serve another purpose in that the film is thus provided with a depressed intermediate portion which receives the kinetographic picture records, which, by this means are protected from pressure when the film is rolled on the spool or reel, thereby protecting them from

abrasion or scratching. This feature is, however, not herein claimed, but is reserved for incorporation in a separate application. The combined kinetographic and phonographic record when used for reproduction purposes, is run through an apparatus having phonographic reproducing means and picture projecting mechanism arranged in the same relative positions as in the apparatus used in making the negative, so that the sounds and views are reproduced with perfect synchronism. It will be understood, of course, that the method described may be used for producing sound records only as well as for producing combined kinetographic and phonographic records.

Referring now to the drawings for a description of the apparatus therein shown,—7 indicates a camera or light-proof box of suitable size and shape to inclose the reels on which the film is wound, and the sound-reproducing apparatus.

8 indicates a reel mounted on a suitable shaft 9, said reel being designed to carry the unexposed film.

10 indicates the negative film, and 11 indicates the rewinding reel mounted on a shaft 12.

13 indicates a pair of guide pulleys mounted on a shaft 15 and arranged adjacent to the reel 8, the shaft 15 being parallel with the shaft 9. The pulleys 13 are provided on their upper surface with a series of pins or sprockets 16 which engage perforations 17 near the margins of the film 10. For the purpose of insuring proper registration of the film, the perforations 17 are rounded at their forward margins and preferably are made elliptical, and the sprockets 16 are correspondingly shaped. If desired, said perforations may be made more or less kite-shaped, with rounded apices at the front or leading portions thereof, as shown at 18 in Fig. 2. The purpose of this arrangement is to provide against lateral movement of the film, since by making the perforations round or somewhat V-shaped at their forward or leading portions and operating them by correspondingly shaped sprockets, the film is held against lateral displacement and its proper alinement is maintained.

19 indicates a pair of drive-wheels similar to the pulleys 13 and mounted on a shaft 20 parallel with the shaft 15. The shaft 20 extends through one side of the camera 7 and is provided with a crank 21 for rotating it. The wheels 19 also have sprockets 22 similar to the sprockets 16. In order to secure a more uniform movement of the film under the action of the drive-wheels 19, the sprockets on the two wheels of each pair, are staggered with relation to each other, and the perforations in the opposite marginal portions of the film bear a staggered relation to each other, as shown in

Fig. 3. The shaft 20 is also provided with a pulley 23 connected by any suitable belt 24 with a pulley 25 on the shaft 12 of the rewinding reel 11. By this construction by rotating the drive-wheels 19 by means of the crank 21, the film 10 is unrolled from the reel 18, and after passing around the pulleys 13 and the drive-wheels 19, is rewound on the reel 11.

26 indicates a conventional representation of a photographic lens arranged adjacent to that part of the film extending between the pulleys 13 and drive-wheels 19. It will be understood that the lens 26 is provided with the usual shutter mechanism required for kinetographic work. The lens is preferably one having the construction shown and described in my application filed Feb. 16, 1912, Serial No. 677,233 for method of and apparatus for producing a round or relief effect by photography.

27 indicates a partition which extends across the upper portion of the camera 7, forming an upper compartment 28.

29 indicates a box or housing which is arranged in the compartment 28 and extends transversely thereof at a point centrally over the pulleys 13. Said box is light tight and contains an incandescent lamp 30, or other suitable source of light.

31—32 indicate two funnel-shaped tubes, the upper and larger ends of which extend up through the partition 27 into the box 29 near the ends thereof and are pivotally mounted on pivots 33—34 which are arranged to permit the tubes 31—32 to swing transversely of the camera. The tubes 31—32 are tapered practically to a point at their lower ends so as to leave a minute passage at their lower ends, the arrangement being such that such passages lie over and adjacent to the marginal portions of the film, as best shown in Fig. 3. In the illustration the lower ends of the tubes 31—32 are shown as somewhat removed from the film for clearness of illustration, but in practice they approximate very closely to the film. The tubes 31—32 are provided at their upper ends with lenses 35, the purpose of which is to focus the light at the lower ends of the tubes.

37 indicates mirrors mounted at the ends of the box 29 in oppositely-inclined positions so as to reflect the light coming from the lamp 30 upon the upper surfaces of the lenses 35, as indicated by dotted lines in Fig. 3. By this construction the light coming from the lamp 30 is concentrated and directed upon the marginal portions of the film 10 so that if the tubes 31—32 were allowed to remain stationary the movement of the film 10 through the camera would result in exposing the marginal portions of the film to light along two straight lines, which would show black on the developed

negative. In order, however, to make these lines of exposure correspond with sound waves, the tubes 31—32 are caused to swing sidewise in conformity to sound wave vibrations and so correspondingly modify the contour of the lines in the marginal portions of the film caused by the exposure. For this purpose, I employ a sound box 38 placed between the tubes 31—32 and having at its ends vibrating diaphragms 39—40 which are connected, respectively, with the tubes 31—32. In the construction illustrated these connections are made by means of bosses 41—42 secured to the diaphragms 39—40, respectively, and connected by pivots 43—44 with lugs 45—46 carried by the tubes 31—32, respectively, as shown in Fig. 3.

47 indicates a horn connected with the sound-box 38. Thus the vibrations of the diaphragms 39—40 under the action of sound waves cause a corresponding vibration or movement of the tubes 31—32, which is magnified because of the projection of said tubes below the point of their connection with the diaphragms. This effects the vibration of the beams of light directed upon the marginal portions of the film so that the exposures thereof correspond exactly in outline with the sound waves which produce them. After the negative film has been exposed, it is developed in the usual way and is then used to make a positive film in the manner already described.

As shown in Fig. 6, the positive film 14, when completed, has the photographic views on the intermediate sunken portion and phonographic record grooves 48 in its marginal portions, the latter being susceptible of reproducing sound by lateral vibrations of a reproducing needle in the ordinary way. The apparatus for reproducing the sound may be similar to the record making apparatus, except that needles are substituted for the tubes 31—32, but any approved reproducing apparatus may be employed.

While my invention is peculiarly applicable to the production of combined kinetographic and phonographic records, it is equally applicable to the reproduction of sound records only, in which case the films would be of appropriate dimensions and the

apparatus employed would also be suitably modified.

That which I claim as my invention, and desire to secure by Letters Patent, is,—

1. The method of making sound records, which consists in forming a negative wave line corresponding with sound waves, by photography, making a positive from such negative on a separate film capable of being hardened by the action of light, and removing the unexposed material.

2. The method of making sound records, which consists in forming a negative wave line corresponding with sound waves, by photography, making a positive from such negative on a separate film composed of a gelatin emulsion containing bichromate of potash, and then removing the unexposed material to form a groove corresponding with the sound wave line.

3. The method of making sound records, which consists in forming a negative wave line corresponding with sound waves, by photography, making a positive from such negative on a separate film composed of an emulsion composed of gelatin, gum arabic and bichromate of potash, and then removing the unexposed material to form a groove corresponding with the sound wave line.

4. The method of making sound records, which consists in forming a negative wave line by photography, corresponding with sound waves, then forming from the negative a positive record by printing on a separate film having a marginal zone composed of material capable of being hardened by the action of light, and then removing the unexposed material.

5. The method of making sound records, which consists in kinetographically producing upon a moving film a negative wave line corresponding with sound waves, and then forming a positive record from such negative film by printing therefrom upon a separate film capable of being hardened by the action of light, and removing the unexposed material.

HAGAR BOLTON BYRON.

Witnesses:

JOHN L. JACKSON,
MINNIE A. HUNTER.

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The first of these is the fact that the
population of the country has increased
very rapidly since the year 1850. This
has been due to a number of causes,
but the most important of them is the
fact that the country has been opened
up for settlement.

The second of these is the fact that the
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but the most important of them is the
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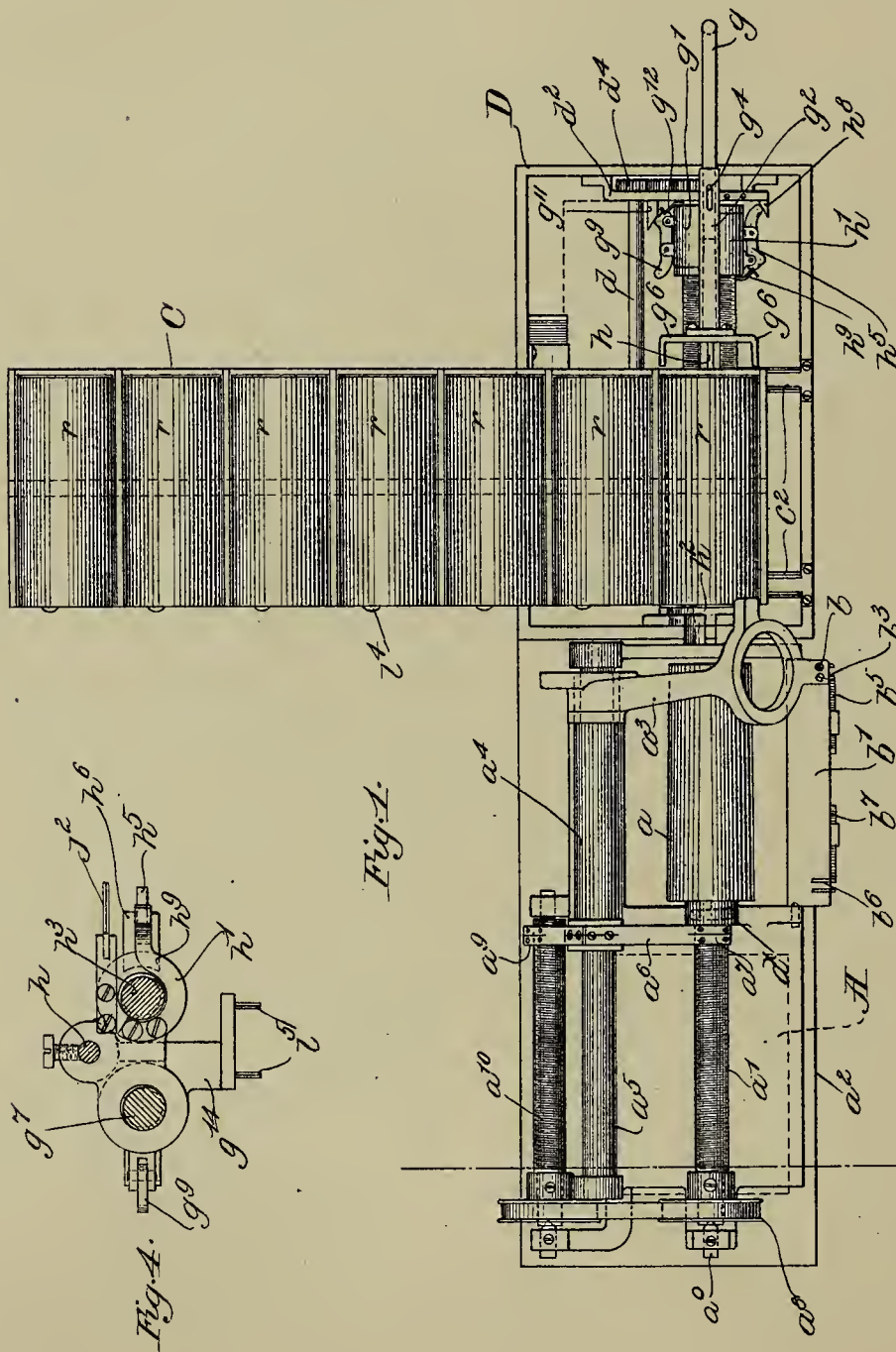
1,185,149.

SOUND REPRODUCING OR RECORDING MACHINE,
#1,185,149-----G. H. Underhill,
Patented-May 30th, 1916.
Filed-July 28th, 1904.

G. H. UNDERHILL.
SOUND REPRODUCING OR RECORDING MACHINE.
APPLICATION FILED JULY 28, 1904.

1,185,149.

Patented May 30, 1916.
5 SHEETS—SHEET 1.

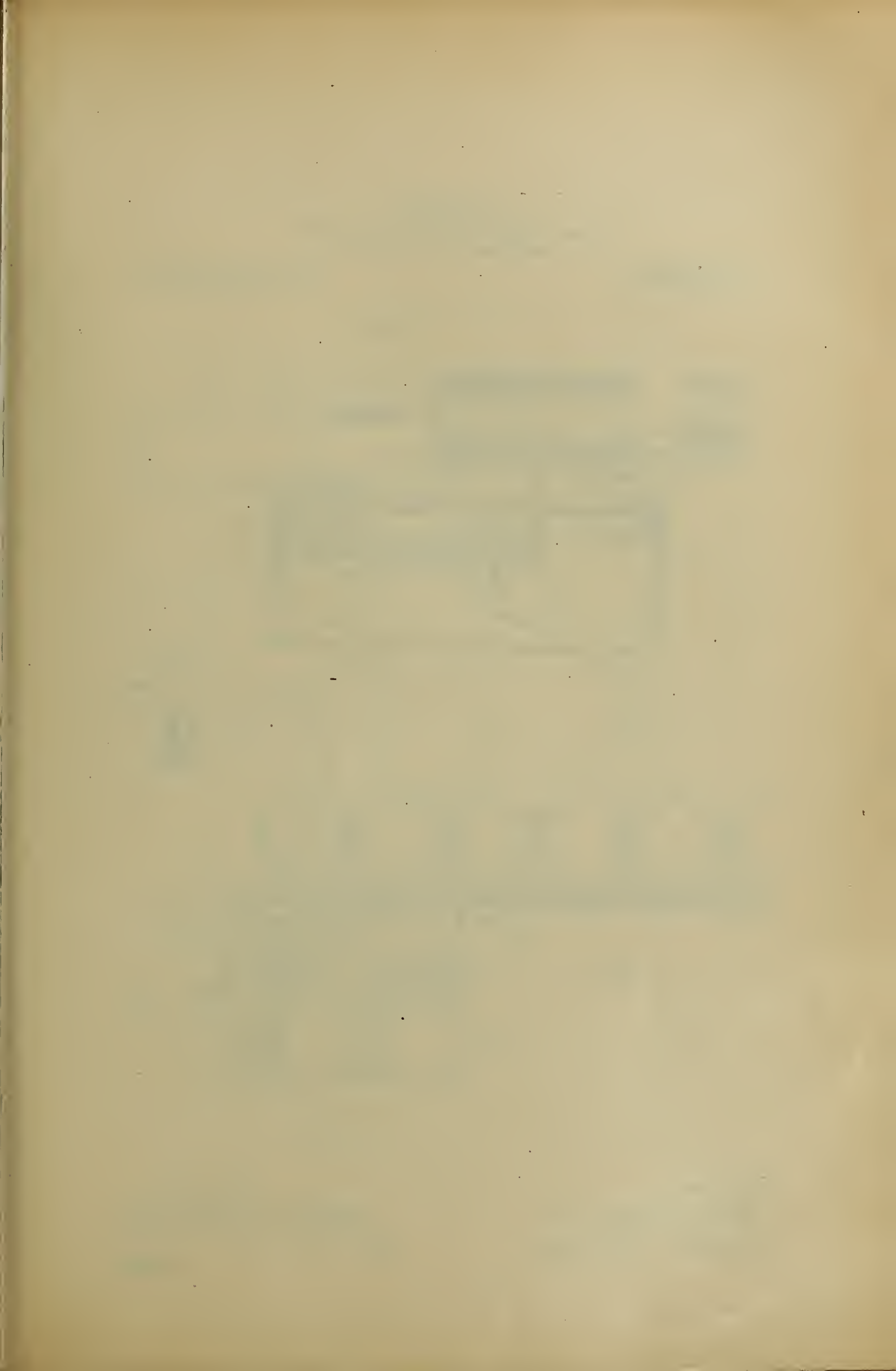


Witnesses:

Honace A. Crossman,
Ernest L. Emery

Inventor:

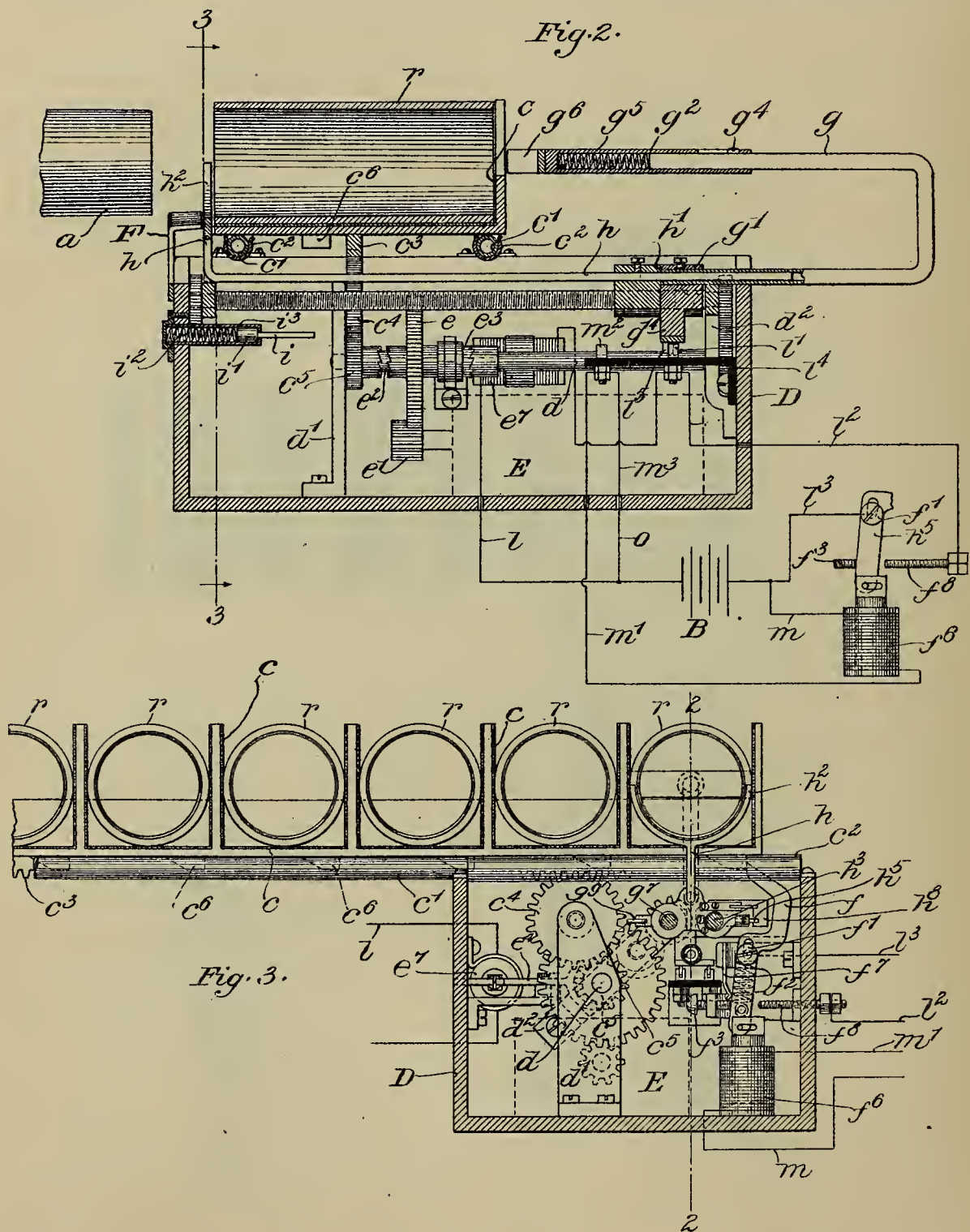
George H. Underhill.
by Emery, Booth & Powell
Attys.



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SOUND REPRODUCING OR RECORDING MACHINE.
APPLICATION FILED JULY 28, 1904.

1,185,149.

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5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

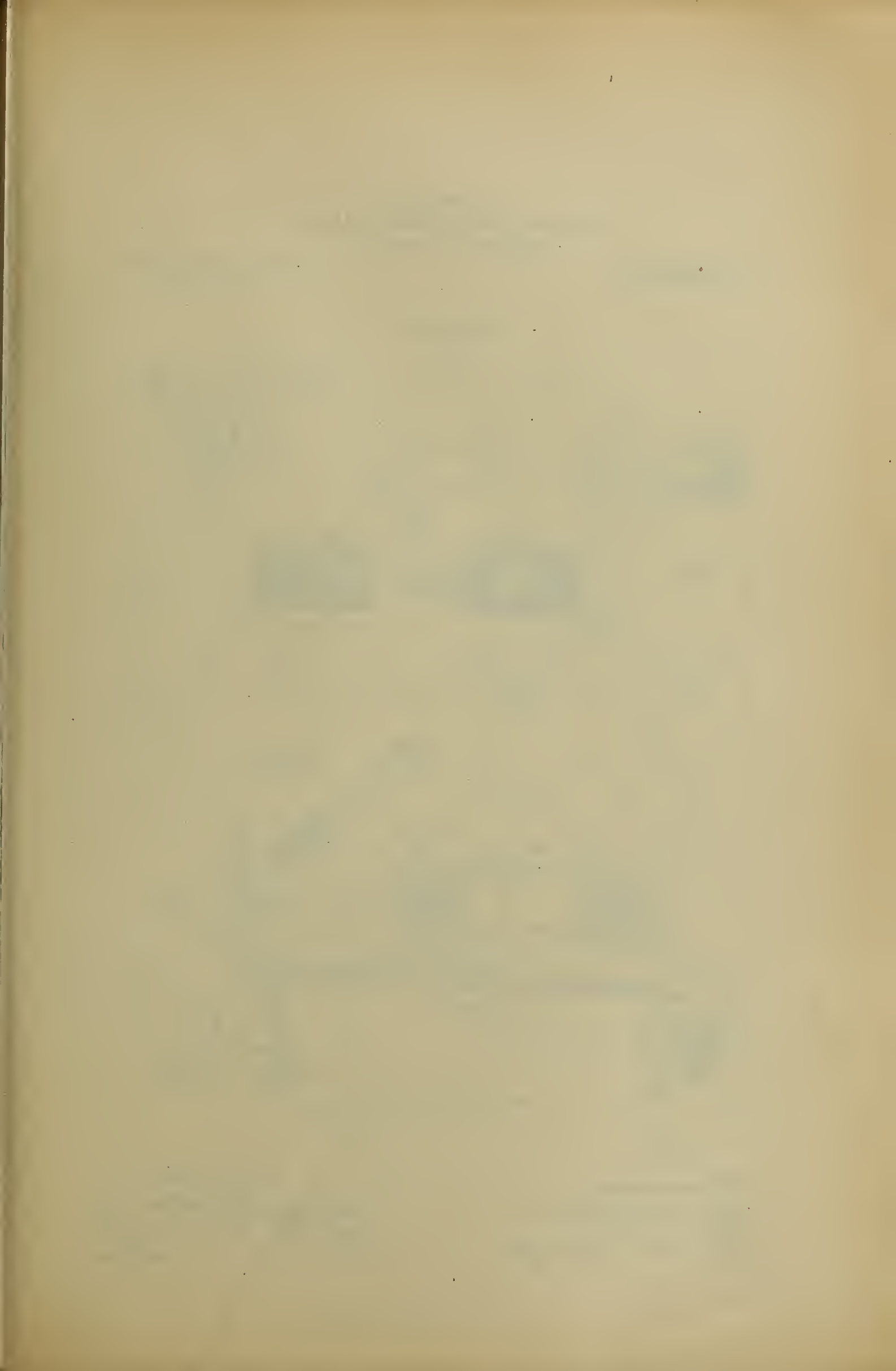


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 Emmett S. Emery.

Fig. 5.

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Attys.



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Fig. 6

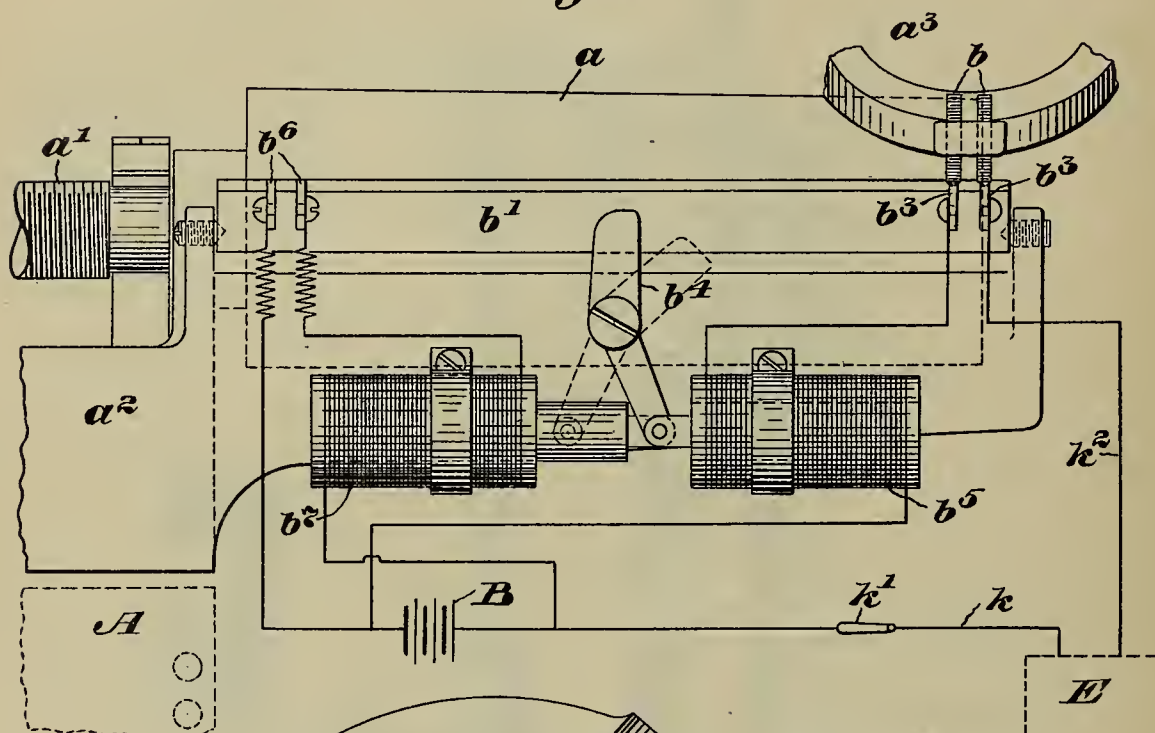
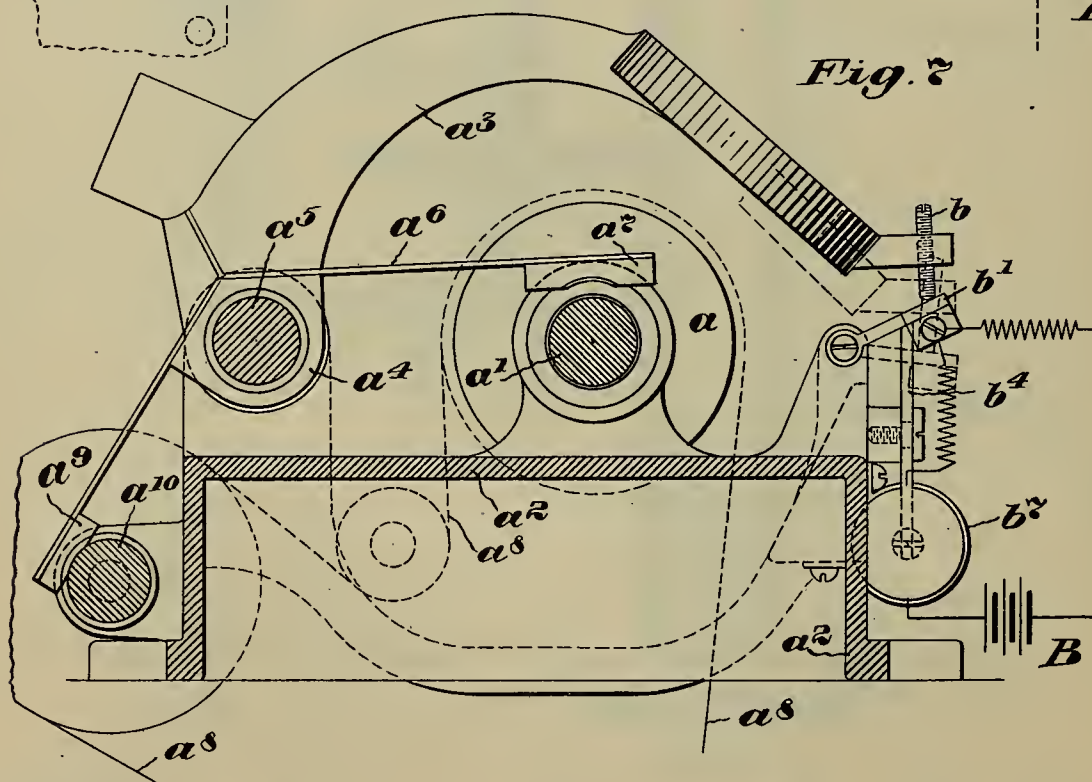
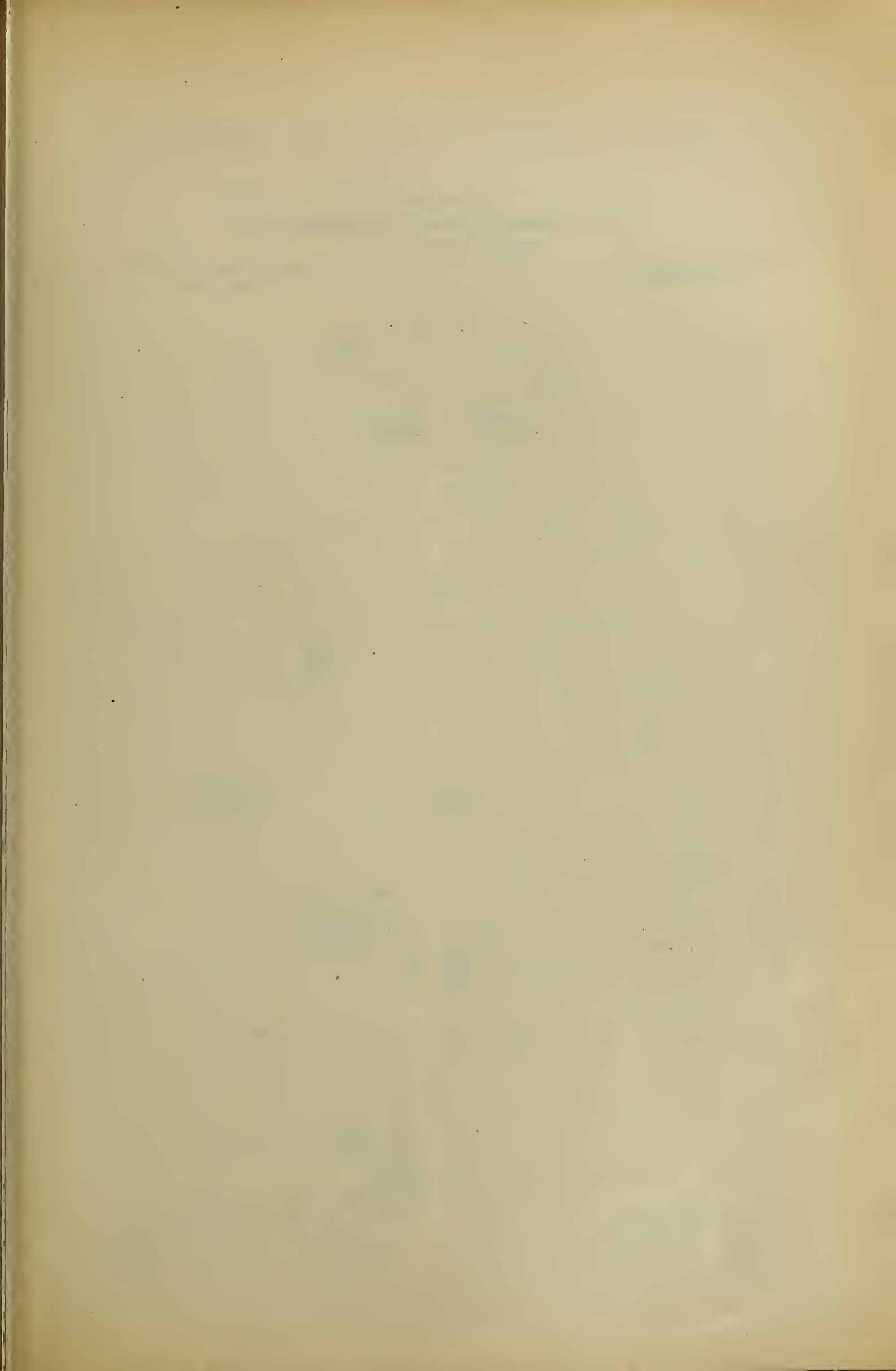


Fig. 2



Witnesses:
Horace A. Crossman.
Elliott L. Emery

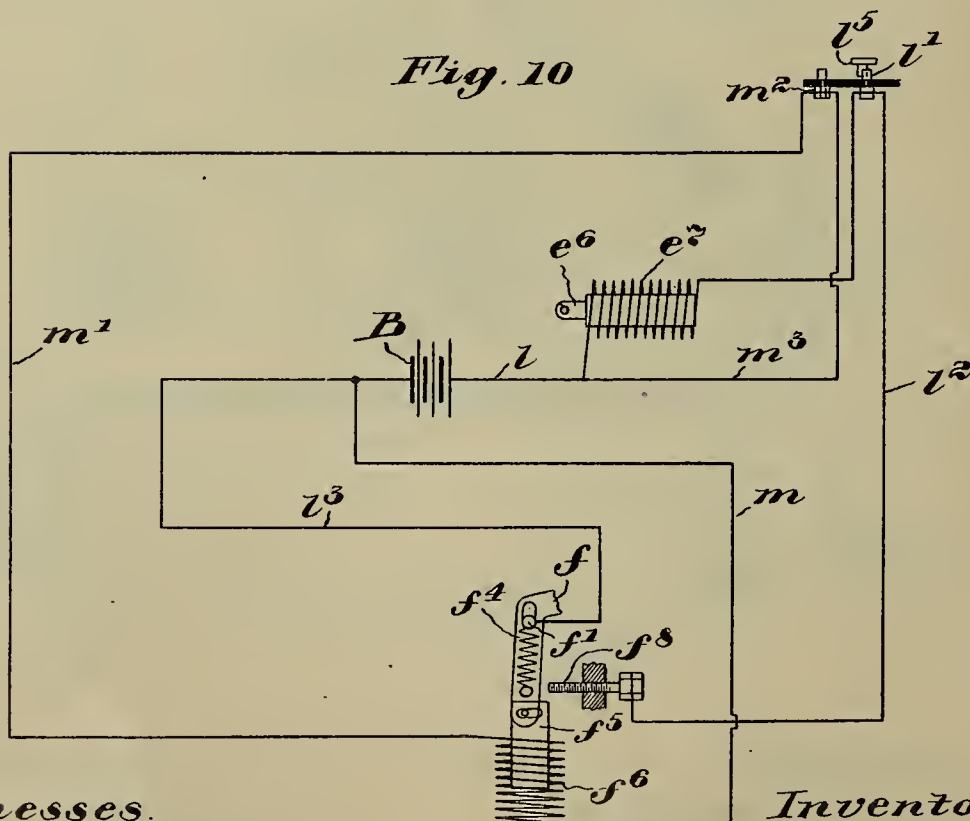
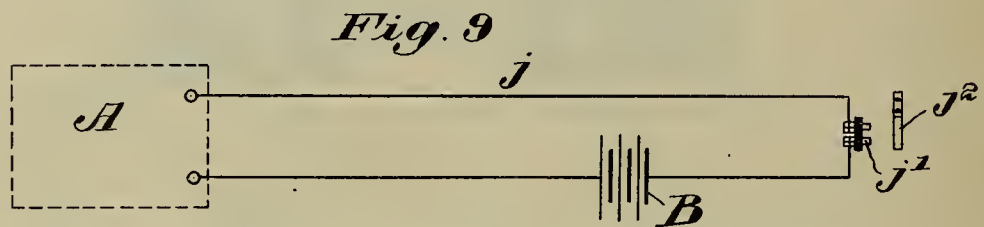
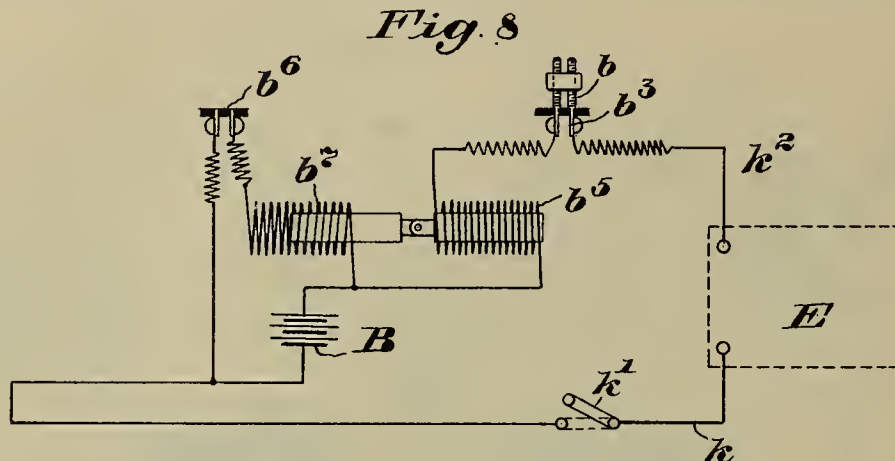
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G. H. UNDERHILL.
SOUND REPRODUCING OR RECORDING MACHINE.
APPLICATION FILED JULY 28, 1904.

1,185,149.

Patented May 30, 1916.
5 SHEETS—SHEET 5.



Witnesses.
Horace A. Crossman.
Ernest S. Emery.

Inventor:
George H. Underhill.
by Emory Booth & Powell
Attys.

UNITED STATES PATENT OFFICE.

GEORGE H. UNDERHILL, OF BOSTON, MASSACHUSETTS.

SOUND REPRODUCING OR RECORDING MACHINE.

1,185,149.

Specification of Letters Patent.

Patented May 30, 1916.

Application filed July 28, 1904. Serial No. 218,492.

To all whom it may concern:

Be it known that I, GEORGE H. UNDERHILL, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Sound Reproducing or Recording Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention consists in improvements in sound-reproducing or recording machines, being particularly, though not exclusively, concerned with machines employing a plurality of records which are brought successively into operative relation with the sound-recording or reproducing mechanism.

I have herein illustrated one specific embodiment of my invention as applied to a sound-reproducing or recording machine employing a feeding mechanism by means of which the records are singly and automatically transferred from a traveling magazine or holder into operative relation with the sound-reproducing mechanism of the machine. Subsequently, after reproduction of an individual record, the latter is then automatically withdrawn from its operative position upon the machine and replaced in the holder, which then advances to bring a fresh record adjacent the machine. The new record is then automatically transferred to the machine, the stylus mechanism restored to its initial position, and the operations of the machine, which, during the interval of feeding the records on and off the holder have been suspended, are repeated as described.

My invention will be best understood from the following description, when taken in connection with the accompanying illustration, of the one specific embodiment thereof by which I have herein illustrated the same, while its scope will be more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a plan view of the machine by which I have herein illustrated my invention; Fig. 2 is a sectional elevation of the record feeding mechanism taken on the line 2—2 in Fig. 3; Fig. 3 is a sectional elevation looking toward the right, and on the line 3—3 in Fig. 2; Fig. 4 is a section on the line 4—4 in Fig. 5 looking toward the right and showing the feeding carriages; Fig. 5 is a plan view on an

enlarged scale of the feeding mechanism with the traveling carrier removed; Fig. 6 is an elevation, partly diagrammatic, showing the tilting shelf and the control thereof; Fig. 7 is an enlarged cross sectional view of the phonograph showing the phonograph feed and the tilting shelf in end elevation, and Figs. 8, 9 and 10 are diagrams of the circuit connections.

In the drawings I have illustrated one embodiment of my invention as applied to a common form of phonograph, employing (Fig. 1) the cylindrical record support *a*, having a slightly tapered exterior, over the smaller end of which may be slid an ordinary cylindrical record shell which is employed in this particular type of machine selected for illustration. The record support *a*. (Figs. 1 and 7) is rigidly connected to the threaded shaft *a'*, the latter being suitably journaled upon the frame *a''* of the machine and adapted to rotate the support with its record, as is usual, in operative relation to the sound-recording or reproducing mechanism. The cylinder overhangs the frame and the ball bearing *a'''*, the latter being provided, in the absence of the usual centering screw at the outer end of the cylinder, to center the same by movement of the screw *a''*. The sound box, stylus and connected parts may be of any desired or ordinary construction, and are therefore not herein shown, but are carried by the arm *a'''*, secured to the sleeve *a''*, slidable on the stationary guiding shaft *a'''*, the latter being parallel with the record support. Secured to one end of the sleeve *a''* (Fig. 7) is an arm *a''''*, carrying the nut *a'''''*, which, during the operation of the machine, is adapted to engage with the comparatively fine threads upon the shaft *a'* and cause the travel of the stylus in contact with the record from the initial end (left-hand in Fig. 1) of the cylinder to the opposite end thereof, the usual rotary motion being imparted to the shaft *a'* and the record through the driving belt *a''''* connected with any suitable phonograph motor, such for example, as the electric motor A indicated in Fig. 1 and diagrammatically in Figs. 6 and 9.

During the travel of the stylus, the threaded, adjustable, electrically connected points *b* (Figs. 1, 6 and 7), carried by, but insulated from, the overhanging end of the arm *a'''*, are caused to contact with the tilting shelf *b'*, hinged to the frame *a''* of the

phonograph and to bridge an electrical circuit between the two contacts b^3 (Fig. 6) upon the face of the shelf b' when the desired limit of stylus travel has been reached.

5 The shelf b' rests upon the cam lever b^4 and, during recording or reproduction, is in the dotted line position Figs. 5 and 6. The completion of the circuit referred to, however, causes, as will be more fully described, energization of the magnet b^5 and the movement of the cam lever b^4 to the full-line position shown, resulting in lifting the shelf b' into the position also shown in full lines. This raises the arm a^3 , with-
10 draws the stylus from the record and the nut a^7 from the feeding screw a' causing the simultaneous engagement of the nut a^9 , also connected to the sleeve a^4 , with the coarse threaded return feed screw a^{10} . After
20 the lapse of an interval, during which the phonograph motor stops and the feeding mechanism acts to substitute a fresh record for the one already on the machine in a manner hereinafter to be described, the
25 phonograph motor again starts and causes the return of the stylus to its initial position through rotation of the screw a^{10} , which is also connected to be driven by the belt a^8 , as shown in Fig. 1. The shape of the cam
30 lever b^4 is such that it naturally remains in the full-line position shown in Figs. 5 and 6, after the points b have left the contacts b^3 and the magnet b^4 has become de-energized, until continued stylus travel
35 causes the points to bridge the contacts b^6 at the opposite end of the shelf b' , acting thereby to energize the magnet b^7 and throw the lever b^4 into the dotted-line position shown, dropping the shelf and the sound-
40 reproducing mechanism into its normal or operative position and bringing the stylus into contact with the new record.

Referring more particularly to Figs. 1 and 3, I have herein provided a record mag-
45 azine or holder C to hold one or any number of records r and from which the said records may be withdrawn and placed upon the record support a . The form and construction of such holder may be widely varied and obviously will be modified to suit
50 the shape, type and construction both of the machine and the records employed, and my invention in this respect is in no wise limited. I have, however, herein shown the
55 holder C to consist of a rectangular tray divided by parallel walls into a number of compartments, herein seven, in which the separated records rest, suitable means being provided, such as the lining c , of felt or
60 like material, for the separate compartments, to prevent injury to the surface of the records. Secured to the bottom of the holder are parallel tubular shoes c' which are adapted to slide within suitable station-
65 ary, semi-tubular guides c^2 secured to the

top of the frame D of the feeding mechanism, the latter being removably connected to the phonograph frame a^2 in such a position that movement of the record holder C upon the frame of the feeding mechanism
70 permits any individual record to be brought into axial alinement with the supporting cylinder a , as is best shown in Figs. 1 and 2. The travel of the holder C is effected by means of a rack c^3 , secured to the bottom
75 thereof, and engaging with a holder driving gear c^4 , the latter meshing with the holder driving pinion c^5 . The pinion c^5 rotates upon the shaft d , the latter being journaled at one end in the stationary up-
80 right support d' and at the opposite end in the bracket d^2 . Loosely mounted on the shaft d , both to rotate and slide thereon, is the main driving gear e , driven by the broad faced intermeshing motor pinion e' , the lat-
85 ter being driven by the feeding motor E, which is indicated in dotted lines, and is preferably electric. The sliding driving gear e is provided at one side with clutch teeth e^2 , adapted to engage with correspond-
90 ing teeth upon the holder driving pinion c^5 , thereby to drive the latter, and also at the opposite side with clutch teeth e^3 to clutch and drive the clutch member d^3 secured to the shaft d , when the said gear is thrown
95 to the position shown in Fig. 5. The position of the driving gear e is controlled by the shifting lever e^4 , which is held normally in the position shown in Fig. 5 by the tension spring e^5 , but, being connected to the
100 core e^6 of the solenoid e^7 , is adapted, on energization of the latter, to be moved about its fulcrum to disengage the teeth e^3 from the clutch member d^3 and to engage the
105 teeth e^2 with the holder driving pinion c^5 . The feed motor, therefore, when in motion, will normally, during deenergization of the magnet e^7 , cause rotation of the shaft d , through the clutch member d^3 , but, upon
110 energization of the said magnet and the subsequent clutching of the driving gear e to the pinion c^5 , movement will be transmitted directly to the latter to rotate the gear c^4 and, through the rack c^3 , cause travel of the
115 holder C.

Depending from the bottom of the holder (Fig. 3) is a series of lugs c^6 , there being provided one to correspond to each of the record compartments, each lug being so located relatively to its respective compart-
120 ment as to bring the contained records in substantially accurate alinement with the supporting cylinder a , when the face of the lug is brought against the tip of the finger f (Fig. 3), the latter being fulcrumed upon a
125 pin f' secured to the bracket f^2 . When a lug c^6 comes in contact with the finger f , the latter is firmly seated against the adjustable stop screw f^3 , also carried by the bracket f^2 , thereby causing the holder to come to a fixed
130

predetermined position. Where the fulcruming pin f' passes through the finger f the latter is slotted, as indicated in Fig. 3, the bottom of the slot however, being normally held against the pin, as shown in Figs. 3 and 10, by means of the tension spring, f^4 , secured between the fulcruming pin and a pin upon the lever. The bottom of the finger f is loosely connected to the plunger f^5 of the solenoid f^6 , so that when the latter is energized, the plunger and the attached finger are drawn downward and against the tension of the spring f^4 . The point of the finger then leaves the face of the lug c^6 , and, the pressure by the lug c^6 against the finger being relieved, the latter is forced by a spring f^7 away from the stop screw f^3 and against the oppositely arranged contact screw f^8 . When drawn downward by the solenoid, the finger f remains in a substantially upright position and, on deenergization of the solenoid, rests with its tip against the bottom of the lug. The holder is now unlatched and may be advanced one step as soon as the driving gear e is clutched to the holder driving pinion c^5 . When the holder moves, the finger, which is pulled upward against the bottom of the lug c^6 by the spring f^4 , is left in position to engage with the succeeding lug and properly position the succeeding record relatively to the phonograph cylinder.

Referring more particularly to Figs. 1, 2, 3 and 5, the mechanism which I have herein illustrated for transferring the records from the holder to the machine, and vice versa, comprises the pusher arm g , one end of which is secured to the traveling pusher carriage g' . The arm has a double bend to bring its other end opposite to and adjacent the outer edges of the records carried by the holder C, where it is provided with a telescopic sleeve, g^2 , slidable upon the end of the arm g with a movement limited by the pin g^4 , acting within a slot upon the sleeve g^2 , there being a spring g^5 located within the sleeve to provide a yielding connection between the said arm g and the pusher foot g^6 , which is secured to the end of the sleeve g^2 . The tips of the pusher foot g^6 are in line with the edges of the record, as shown in Figs. 1 and 2, and are adapted to engage the same and push the record out of its tray and on to the supporting cylinder a , when the pusher carriage g' is moved from right to left. To remove the record from the cylinder and replace it in its tray from the holder, there is provided the puller arm, h , secured to the puller carriage, h' , the said arm having its end projecting beyond the carriage h' , in axial alinement with, and entering, the tubular end of the puller arm g . The opposite end of the puller arm h is bent upward and carries the semi-circular yoke h^2 , which lies adjacent the inner edges of

that record in alinement with the record cylinder. When the record is forced upon the cylinder under the impulse of the pusher arm, the puller carriage h' , as will be more fully described, is caused to advance with the pusher carriage g' , and the puller yoke passes beneath the cylinder a before the advancing record. After the record has been used, it is returned to the holder by opposite movement of the feeding carriages g' and h' , which cause the puller yoke h^2 to engage with the edge of the record and pull it off from the cylinder and into its tray on the holder into the position shown in Fig. 2. The slotted guiding bracket F (Fig. 2) assists in guiding the records in their passage from the cylinder to the holder.

Referring now to the construction of the feeding carriages and more particularly to Figs. 3, 4 and 5, said carriages are adapted to slide lengthwise the feeding screws g^7 and h^3 . The pusher screw g^7 is rotated from the shaft d , the latter having (Fig. 5) the driving pinion d^4 intermeshing with the intermediate gear d^5 , the latter engaging with the gear d^6 upon the pusher screw g^7 . The puller screw h^3 is provided with the gear h^4 intermeshing with the gear g^8 upon the pusher screw g^7 and rotated thereby in a direction reverse to that of the pusher screw g^7 . The carriages present to each other closely fitting surfaces (Fig. 5) so that they may travel as a unit, one carriage forcing the other ahead of it, or they may undergo slight separation as will hereafter appear. The carriage g' (Fig. 5) is provided at its side with the fulcrumed arm g^9 , carrying the nut g^{10} , which may be swung into and out of engagement with the pusher screw g^7 through an opening in the side of the carriage by movement of the lever g^9 . The latter is thrown to its position of engagement by contact with the stationary cam g^{11} , which occurs in the outer position of the carriage and as shown in Fig. 5, the spring g^{12} cooperating with a notch in the side of the lever to retain the lever and the nut in their engaging positions until the carriage has reached the limit of its travel in the opposite direction. When the disengaging cam g^{13} contacts with the opposite end of the lever g^9 to cause the latter to withdraw the nut g^{10} from engagement with the screw, in which position it is retained by the said spring g^{12} . Upon the puller carriage h' I have also provided a lever h^5 carrying a nut h^6 , which is thrown into and out of engagement with the screw h^3 by contact with the stationary cams h^7 and h^8 , respectively: the spring h^9 being also provided, and the several parts acting with respect to the carriage h' precisely, although in reverse order, as the parts described upon the pusher carriage g' . Thus, when the two carriages are in the position

shown in Fig. 5, the nut h^6 is out of engagement and the nut g^{10} in engagement with its feed screw, and subsequent rotation of the said screws will cause the travel of the two carriages in a left-handed direction (Fig. 5), the pusher carriage forcing the puller carriage ahead of it, until the opposite limit of travel has been reached, when engagement of the levers g^9 and h^5 with the cams g^{13} and h^7 , respectively, will disengage the nut g^{10} from the pusher feed screw g^7 and engage the nut h^6 with the puller feed screw h^3 , and subsequent rotation of the feed screws will obviously result in the return of the two carriages. In order to clear the pusher arm from the record after the latter has been seated upon its support and to permit the free rotation of the record thereafter without interference, at the inner or left-hand end (Figs. 2 and 5) of the pusher carriage travel, I have provided the plunger i having a piston i' seated against the compression spring i^2 in the cylinder i^3 . The pusher carriage is provided with a depending arm g^{14} which is adapted to engage with the end of the plunger i before the record has been pushed to its seat and to compress the spring i^2 before completion of carriage movement. At the moment the nut g^{10} is withdrawn from the pusher screw g^7 , the carriage is forced back by the spring-pressed plunger i , clearing the pusher foot g^6 from the end of the record. The puller arm is cleared from the record at each advance of the holder by a series of small projections i^4 at the side of the holder which force the puller arm into the position shown in Fig. 2.

The electrical controlling circuits, which, it will be understood, are shown in the several views, for the sake of clearness, largely diagrammatically, will be explained in connection with the description of the mode of operation of the machine which will now be given. Assuming that the traveling holder is in the position shown in Fig. 1 and that the first of the records is to be placed upon the machine, the feeding carriages g' and h' and the stylus carrying arm a^3 will also be in the position shown in Fig. 1, said stylus carrying arm having previously been raised into its inoperative position, ready for return, as shown in Fig. 7. The phonograph motor A is now at rest, for its circuit j (Fig. 9) passes through two insulated contact fingers j' , which, (Fig. 5) are adjustably secured upon the frame D of the feeding mechanism, and at the left-hand end thereof as viewed in Fig. 5, within the path of the contact blade j^2 , the latter being carried upon the puller carriage h' and adapted to bridge the said contacts, and therefore energize and start the phonograph motor, only when the said carriage is at its extreme limit of travel opposite to that shown in Fig. 5.

The feeding motor E has one of its poles connected (Figs. 5 and 8) by means of a conductor k through a suitable circuit closing device k' , herein a hand-operated switch, with a source of electro-motive force B. The other pole of the motor is connected to the conductor k^2 in series with the contacts b^3 upon the tilting shelf b' and the solenoid b^5 , which operates to raise the said shelf. Thus, it will be seen that the feeding motor circuit may be broken either at the contacts b^3 or the switch k' , the former being now closed on account of the position of the arm a^3 . As soon as the main controlling switch k' is closed, the feeding motor immediately starts up and causes rotation of the feeding screws g^7 and h^3 . The pusher carriage being in engagement with the pusher feeding screw g^7 , the two carriages are caused to travel lengthwise the screw g^7 ; the pusher foot g^6 meets the ends of the record shell, forces it out of the holder and over the end of the adjacent cylinder; the yielding connection between the foot g^6 and the pusher arm g permitting the latter to seat the record firmly upon the cylinder, without, however, the possibility of injury thereto, and permitting adaptation to variations in the exact size of the records. When the record is firmly seated upon the cylinder and the two carriages reach their limit of travel, as soon as disengagement of the nut g^{10} occurs, the spring i^2 , which has been previously compressed by the depending arm g^{14} upon the pusher carriage, throws the latter backward far enough to clear the foot g^6 from the cylinder. Simultaneously, the cam h^7 moves the lever h^5 to engage the nut h^6 with the puller feeding screw h^3 . In the meantime, however, and before reverse movement of the puller carriage h' can take place, the switch blade j^2 mounted thereon has bridged the contacts j' and caused the phonograph motor A to start, thus causing rotation of the reverse, phonograph feed screw a^{10} and the backward travel of the stylus carrying arm a^3 . The first movement of the latter causes the withdrawal of the contact points b from the contacts b^3 and the interruption of the feed motor circuit, as will be evident from Fig. 8, the adjustment of the parts being such as to start the phonograph motor and stop the feed motor at substantially the same instant. The phonograph motor having started, the stylus carrying arm returns to its initial position, where bridging of the contacts b^6 energizes the solenoid b^7 , drops the tilting shelf b' , causes engagement between the stylus and the record and starts the recording or reproduction, as the case may be. The record or reproduction will continue until the stylus arm has again reached the position where the contact points b bridge the contacts b^3 , 130

whereupon the feed motor E and the feeding screws g^7 and h^3 again start, immediately stopping the phonograph motor through the withdrawal of the switch blade j^2 from the contacts j' , which takes place on the initial movement of the puller carriage h' , which is now in engagement with the puller screw h^3 . Movement of the puller carriage h' causes the pulling yoke h^2 forcibly to withdraw the record from the supporting cylinder a into its compartment upon the holder C. On this return movement the carriage h' overtakes the displaced pusher carriage g' and forces the same with its connected pusher arm to its limit of travel, where, as has been described, the puller mechanism is disengaged and the pusher mechanism engaged with its corresponding screw.

Simultaneously, with the engagement of the pusher carriage with its feed screw, the rotation of the latter is interrupted for an interval by energization of the solenoid e^7 , which clutches the driving gear e to the holder driving pinion e^5 , thereby to cause the holder to advance one step to bring a fresh record adjacent to and in alinement with the supporting cylinder a . The energization of the solenoid e^7 is effected in the following manner: Referring more particularly to Figs. 2 and 10, the solenoid e^7 is in series with the conductor l leading from the battery B; through the normally separated contacts l' , thence through the conductor l^2 to the contact pin f^8 adapted to contact with the face of the finger f when the latter is drawn downwardly by the solenoid f^6 . The other pole of the battery B is connected, through the conductor l^3 , with the pin f' and therethrough with the finger f , so that the circuit is bridged at the contact pin f^8 when the finger f contacts therewith. The contacts l' are carried by the bracket l^4 , secured to the frame D, and the circuit through the solenoid e^7 may be completed by bridging these contacts, which is accomplished by the traveling contact l^5 carried by the depending pusher carriage arm g^{14} , the bridging of the said contacts occurring when the carriage is at its outward limit of travel, as best shown in Fig. 2. To permit the full completion of the circuit and the energization of the solenoid e^7 , when the carriage reaches that position, and before opportunity is given for backward travel, the other break in the said circuit at the contact pin f^8 has been previously closed by energization of the solenoid f^6 . The latter (Figs. 2 and 10) is connected with one pole of the battery B through the conductor m , and with the other battery pole by a circuit which leads first through the conductor m' to the contacts m^2 and thence to the battery through the conductor m^3 . The two contacts m^2 are also secured to the bracket l^4

and within the path of the traveling contact l^5 , but slightly displaced from the contacts l' .

At the early part of the travel of the pusher carriage, when it is engaged in pushing the record on to the cylinder, the contact l^5 bridges the contacts m^2 , closing the circuit of the solenoid f^6 and thus permits the spring f^7 to force the lower part of the finger lever f upon the contact pin f^8 and to close the break in the clutch solenoid circuit at that point. When, on subsequent carriage travel, the circuit of the solenoid f^6 is again broken, the released finger lever still remains in contact with the pin f^8 , the point of the finger resting against the bottom of the lug c^6 . After the feeding mechanism has carried the record on to the cylinder and then withdrawn the same and finally deposited it in the holder, it reaches the position shown in Fig. 2, where it then completes the clutch solenoid circuit by bridging the contacts l' , immediately throwing the clutch to advance the carriage, which now travels until the face of the next succeeding lug meets the finger point, which throws the finger away from the pin f^8 and seats it against the stop pin f^3 , as shown in Fig. 3. This interrupts the clutch solenoid circuit and unclutches the gear e from the holding driving pinion e^5 , bringing the holder to rest in the position determined by the finger f . The gear e is simultaneously clutched to the shaft d , through action of the spring e^5 , immediately starting the previously engaged pusher carriage in motion, to carry the new record on to the cylinder. This alternating operation of the phonograph mechanism and the feeding mechanism may continue as long as desired or may be stopped at any time by opening the circuit at the switch k' .

I have herein shown the various electromotive devices connected to a battery or batteries designated as B, but obviously any source of electro-motive force may be employed for this purpose and such electromotive devices obviously may have a common or separate sources of electro-motive force, as desired.

It will be observed that the feeding mechanism which has been described is independent of and may be readily applied to or withdrawn from the phonograph shown, to permit the latter to be operated with or without the auxiliary feed. When it is desired to operate the phonograph without the feeding mechanism, the same may be set in motion by short-circuiting the contacts j' through a controlling switch which may be provided for that purpose.

It is to be understood that my invention is not confined to any particular type of phonograph, or other sound-reproducing or recording machine, nor to the details or rela-

tive arrangement of parts composing the feeding mechanism, for these may undergo extensive modification without departing from the spirit of my invention, and many changes, both in construction and in mode of operation, which I do not deem it necessary to refer to, will be suggested to those skilled in the art. Furthermore, as will be readily understood by those skilled in the art, many obvious changes, unnecessary to refer to, may be made in the application of my invention to other types of machines or other purposes than the specific one herein disclosed. It is also to be understood that the particular form of record holder here employed may be varied widely from that shown, to suit conditions of use, the form, capacity, construction and mode of operation of the holder herein shown being submitted for illustrative purposes.

Claims:

1. In an apparatus of the class described, the combination with reproducing or recording mechanism of means for supporting a cylindrical record in operative relation to said mechanism, record holding means for holding a cylindrical record and means for automatically transferring a cylindrical record from said holding means to said supporting means.

2. In an apparatus of the class described, the combination with reproducing or recording mechanism, of means for supporting a cylindrical record in operative relation to said mechanism, record holding means for holding a cylindrical record and means for automatically transferring a cylindrical record from its operative position to said holding means.

3. In an apparatus of the class described, the combination with a sound-reproducing or recording machine having a record support, record holding means for holding a plurality of cylindrical records, means for moving said holding means relatively to said cylindrical record support to bring a record adjacent the same and automatic means for transferring a record from said holder to said support.

4. In an apparatus of the class described, the combination with a sound-reproducing or recording machine of a record support, a traveling record holder to hold a plurality of cylindrical records, automatic feeding means to feed a cylindrical record to and withdraw the same from said support, and means to advance said holder relatively to said support between operations of said feeding mechanism.

5. A sound-reproducing or recording machine, comprising in combination means for holding a plurality of cylindrical records and feeding means for automatically feeding said records from the holding means to an operative position on said machine.

6. In an apparatus of the class described, the combination with a cylindrical record support of means for automatically seating a record upon said support.

7. In a sound-reproducing or recording machine, the combination with a holder for cylindrical records of means automatically to remove the records from said holder.

8. In a sound-reproducing or recording machine, the combination with reproducing or recording mechanism, of means for holding one or more cylindrical records and means for automatically bringing a cylindrical record into and out of operative relation to said recording or reproducing mechanism, said means involving relative movement between said cylindrical record and said holder and freeing the former from the latter.

9. In a multiple record phonograph the combination with a plurality of cylindrical records, of a holder for said cylindrical records and means automatically to shift a record from said holder into playing position.

10. In a multiple record phonograph the combination with a plurality of cylindrical records, of a holder for said cylindrical records, means to shift a record from said holder into playing position and means automatically to present said records successively to said shifting means.

11. In a multiple record phonograph the combination with a plurality of cylindrical records, of a rotatable support, a holder and means automatically to shift a record from the holder to the support.

12. In a multiple record phonograph the combination with a rotatable support, of a holder to receive cylindrical records, means automatically to shift a cylindrical record from the holder to the support and back to the holder and means automatically to feed the holder.

13. In a multiple record phonograph the combination with a holder, of means for automatically moving the holder to bring each record as disposed thereon into axial alignment with its playing position and means to shift said record axially from said holder into playing position.

14. In a multiple record phonograph the combination with a record carrier for holding cylindrical records, of means for advancing said carrier as a whole to bring successive records into an approximate playing position and means for automatically shifting a record from said carrier and from said approximate playing position into an exact playing position.

15. In a multiple record phonograph the combination with a holder having compartments for holding a series of cylindrical records, of means for reciprocatively moving said holder to bring said records successively into an approximate playing

position, and means for shifting a record to an exact playing position.

16. In a multiple record phonograph the combination with a holder for holding a series of cylindrical record shells, said shells being held loosely in said holder, of means for moving said holder to bring said shells into approximate playing position and means for automatically freeing a record shell from the holder and bringing it into exact playing position.

17. In a multiple record phonograph the combination with a record carrier for holding a series of cylindrical record shells, the latter adapted to rest upon their sides in said holder, of means automatically to engage a record shell and free it from the holder.

18. A phonograph having record holding means for loosely holding a cylindrical record and means for automatically engaging the record and placing it in playing position.

19. A phonograph having record holding means for holding a cylindrical record and means for automatically freeing a record from the holding means.

20. A multiple record phonograph having means for holding a plurality of cylindrical record shells, means for bringing the record shells into alinement with their final playing position, and means engaging with the walls of the record shells automatically to shift them to exact playing position.

21. The combination with a sound reproducing machine and its motor, of a record holder, a traveling member adapted to engage a record and shift it from said holder to said phonograph and a resilient buffer to move said member from braking contact with the record at the end of its travel.

22. A sound reproducing machine, comprising in combination, an electrically operated reproducing mechanism, a record holder, and a traveling member to shift a record from said holder to operative relation with said reproducing mechanism, the member acting to close the circuit of said mechanism at the close of its record transferring movement.

23. A sound reproducing machine, com-

prising in combination, an electrically operated reproducing mechanism, a record holder, and a traveling member having independent electrical operation to transfer a record between said holder and said reproducing mechanism, said mechanism and member acting in cycle, and mutually serving at the close of their respective periods of movement to complete the circuit one of another.

24. A sound reproducing machine, comprising in combination, a reproducing mechanism, a record holder, a traveling member adapted to shift a record to and from said record holder from and to said reproducing mechanism, feed screws for actuating said member and automatic means for bringing said member into driven relation to said feed screws.

25. A sound reproducing machine, comprising in combination, a reproducing mechanism, a record magazine, a traveling member adapted to feed a record from said magazine to said mechanism and to discharge the same from mechanism to magazine, and an electrically operated clutch to move said magazine in cycle with and between said discharging and charging movements, the member in its travel acting to energize the clutch operating mechanism at the close of the discharging movement.

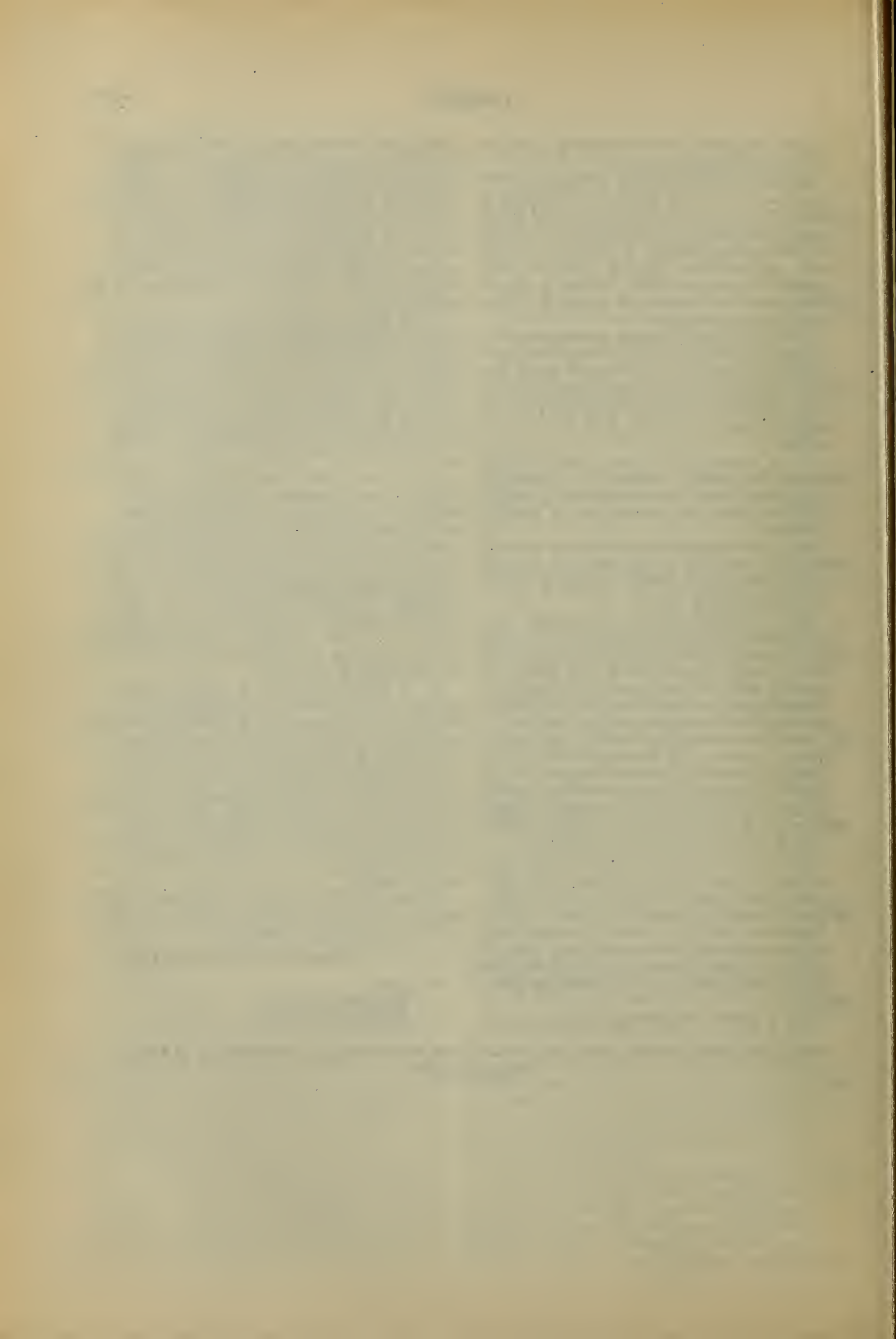
26. A sound reproducing machine, comprising in combination, a reproducing mechanism, a record magazine, a traveling member adapted to feed a record from said magazine to said mechanism and to discharge the same from mechanism to magazine, and an electrically operating mechanism to move said magazine in cycle with and between said discharging and charging movements, the member in its travel acting to energize said mechanism at the close of the discharging movement.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEORGE H. UNDERHILL.

Witnesses:

THOMAS B. BOOTH,
EVERETT S. EMERY.



1,185,266

TONE VARYING ATTACHMENT FOR RE-
PRODUCING NEEDLES,
#1,185,266-----R. H. Vesey,
Patented-May 30th, 1916.
Filed-July 6th, 1915.

R. H. VESEY.
TONE VARYING ATTACHMENT FOR REPRODUCING NEEDLES.
APPLICATION FILED JULY 6, 1915.

1,185,266.

Patented May 30, 1916.

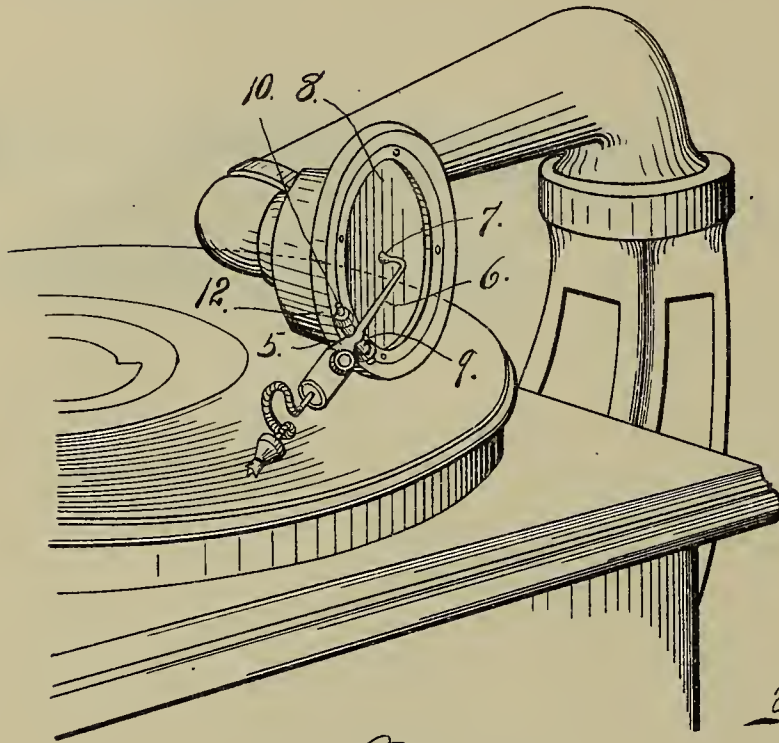


Fig. 1.

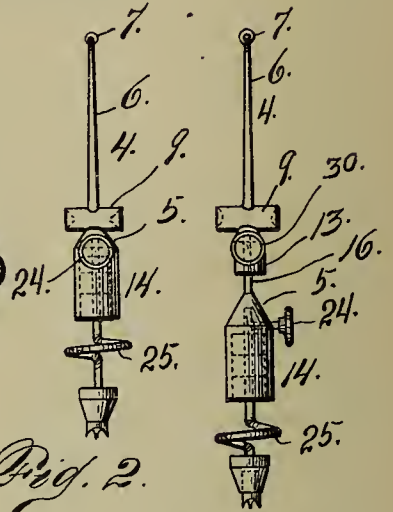


Fig. 2.

Fig. 3.

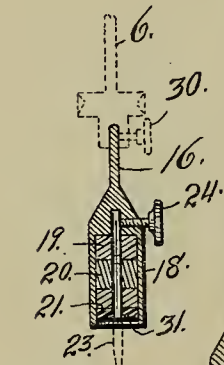


Fig. 4.

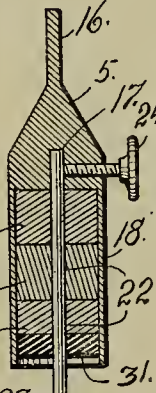


Fig. 6.

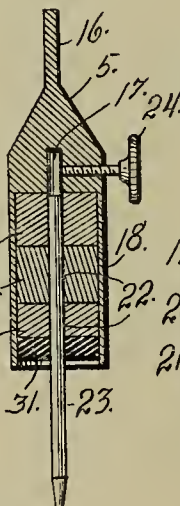


Fig. 7.

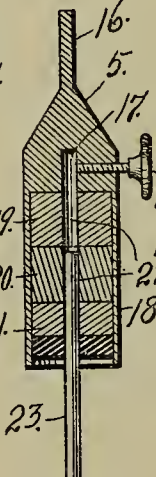


Fig. 8.

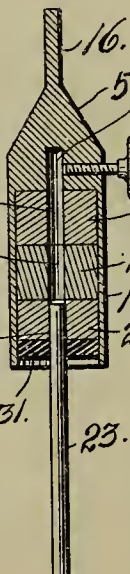


Fig. 9.

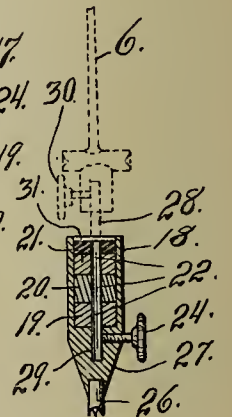


Fig. 5.

Witness

Otto E. Hoddick.

John B. Wade.

Inventor

Richard H. Vesey.

By

A. J. [Signature] Attorney

UNITED STATES PATENT OFFICE.

RICHARD H. VESEY, OF DENVER, COLORADO.

TONE-VARYING ATTACHMENT FOR REPRODUCING-NEEDLES.

1,185,266.

Specification of Letters Patent.

Patented May 30, 1916.

Application filed July 6, 1915. Serial No. 38,194.

To all whom it may concern:

Be it known that I, RICHARD H. VESEY, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Tone-Varying Attachments for Reproducing-Needles; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in means applied to the reproducing needles of instruments such as phonographs, graphophones and other similar sound reproducing structures.

My improvement consists in equipping the needle holder with a number of pieces or blocks composed of substances varying in hardness or density, all of them preferably being of less density than metal of which the usual needle holder is composed.

In my improvement the needle holder is simply extended, the extension consisting of a hollow part which may be integral with the ordinary needle holding member, within which hollow part is located a number of members of varying density or hardness as heretofore stated. These members are perforated to register with the recess or socket of the ordinary needle holding part. The needle, if relatively loud results are required, should extend into the metal socket or recess of the ordinary metal part. When it is desired to vary the tone by making it lower or softer, the needle is withdrawn from the metal socket so that its inner extremity shall engage one of the members of my improvement. As these members themselves are of varying density or hardness, as many different primary or basic variations in tone may be obtained, as there are different members or substances employed. In the construction illustrated in the drawing I have shown three blocks or pieces, composed of different material from the metal holder, the said blocks or pieces also varying in density as compared with one another. Consequently four different primary tone variations may be obtained, one when the needle is in the socket of the metal holder, and others as the inner extremity of

the needle is left within the other blocks or pieces of my improvement. Furthermore a great variety of sub tone-variations may be obtained by varying the distances which the needle penetrates any one of the said members. In order to vary the tone it is only necessary to adjust the needle by moving it outwardly or inwardly as may be required.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing, in which is illustrated an embodiment thereof.

In this drawing, Figure 1 is a perspective view of a sound reproducing machine of the disk type, the needle holder being equipped with my improvement. Fig. 2 is a detail view of a needle and needle holder likewise equipped. Fig. 3 is a similar view showing a slightly modified form of construction. Fig. 4 is a sectional view in detail showing my improvement applied to a needle holder of ordinary construction, the latter being indicated by dotted lines. Fig. 5 is a similar view showing a slightly modified form of construction. Figs. 6 to 9 inclusive are detail sectional views showing my improved needle holder construction with the needle in different positions of adjustment, the parts being shown on a larger scale than in the other views.

The same reference characters indicate the same parts in all the views.

Let the numeral 4 designate a needle holder having a stem or shank 6 whose extremity 7 engages the diaphragm 8 of a sound reproducing instrument. This holder is provided with a bearing 9 which is trunnioned at 10 on the rim or frame 12 of the instrument to permit the necessary oscillation for sound reproducing purposes. These features are of ordinary construction.

My improvement may be applied directly to the bearing 9 (see Fig. 2), or it may be secured to the member 13 with which the needle is directly connected in the needle holder constructions heretofore known. In manufacturing the device for new machines or when it is preferred to manufacture the article in its entirety, I prefer to employ the construction shown in Fig. 2. When, however, it is desired to employ my improvement in connection with needle holders already constructed, the form shown in Fig. 3 may be used.

My improvement consists of a feature

designated 14 in the drawing. This element is composed of a body part 5 preferably consisting of metal and having a stem 16 which may be inserted in the member 13 of the ordinary needle holder. In this event the stem 16 takes the place of the inner extremity of the needle and is held in place by a set screw 30 (see Figs. 3 and 4). The part 5 is extended beyond the metal socket 17 therein, to form a shell or casing 18 in which are located a number of members designated 19, 20 and 21 respectively. These members are held in place within the shell or casing in any suitable manner. Each is provided with a perforation 22 which registers with the socket or recess 17 of the part 5, whereby the shank 23 of the needle passes through the perforations of all of these members, when its inner extremity is in the recess or socket 17. When it is desired to lower or soften the tone, a set screw 24 is loosened, whereby the needle is allowed to be drawn outwardly whereby it is disengaged from the metal part 5, and whereby its inner extremity may be located within any one of the members 19, 20 or 21, with the result that a great variety of variations in tone may be obtained, since the members 19, 20 and 21 vary in hardness or density from one another and also from the part 5. Furthermore by varying the length of the needle shank which penetrates any of these members, the tone may be further varied. Hence the range of adjustment is such as to permit an exceedingly wide range of tone variation, even where but three of these members are employed. But it is evident that the number of these tone varying members may change as may be required.

In the form of construction shown in Fig. 2 the part 5 of the structure 14 is formed directly on the bearing part 9, the stem 16 being dispensed with. In this case the entire needle holder is manufactured with reference to my improved, while in the other forms of construction, my improved feature is illustrated as an attachment for the ordinary needle holder as best illustrated in Fig. 3.

In the form of construction shown in Figs. 2 and 3, the shank of the needle beyond the tone varying structure of my improvement, is provided with a spring member 25 consisting approximately of a single spiral spring convolution. This feature gives additional tone varying results.

In the form of construction shown in Figs. 5, the needle proper is designated 26 and is mounted in the metal end 27 of the casing 18 of my improvement. In this form of construction a shank or pin 28 is inserted in a socket 29 of the part 27 and passes through the three members 19, 20 and 21 of my improvement. This shank or pin 28 protrudes beyond the casing 18 and is connected with

the ordinary needle holder by a set screw 30. By adjusting the pin or shank 28 in the manner heretofore explained with reference to the adjustment of the needle in the other forms of construction, tone varying results may be obtained similar to those secured from the other form of the device.

In Figs. 4 and 6 to 9 inclusive, the needle shown is simply a conventional or plain form of device, and intended to represent any suitable construction of needle, since it is evident that my improvement is not limited to any special form or style of needle.

The outer extremity of the device 14 is equipped with a piece or layer 31 of some elastic material whose function is, by virtue of its elasticity to retain the needle in place after its inner extremity has been disengaged from the set screw 24. Furthermore this elastic element allows the needle a limited degree of lateral yielding movement while in use, thus obviating the wear upon the record incident to the use of needle holders of the usual or ordinary construction.

So far as a material of which the pieces 19, 20 and 21, are constructed I wish to state that a great many substances of varying hardness or density are adapted for use, as the different kinds of wood, fiber, pigskin, and various compositions which it is not deemed necessary to disclose in this application since if they can be protected, such protection could only be obtained by separate applications.

Having thus described my invention, what I claim is,—

1. A needle holder of the class described, equipped with a number of substances perforated to receive the needle, said substances being of varying density or hardness, and the needle being adjustable for tone varying purposes.

2. A holder for sound reproducing needles, said holder comprising a body member and another substance differing in density or hardness from the material of the body member, the body member having a recess to receive the inner extremity of the needle, and the other substance being perforated to register with said recess and so arranged that the needle when in the recess of the body member passes through the perforation of said substance, the needle being adjustable to cause its inner extremity to engage the body member or the other substance as may be required.

3. A holder for a sound reproducing needle, comprising a body member recessed to receive the inner extremity of the needle, and a number of other substances arranged in operative relation with the body member and perforated to register with the recess in the body member, the arrangement being such that when the inner extremity of the

needle engages the recess of the body member, the shank of the needle passes through the perforations of the other substances, the said substances varying in hardness from 5 the body member and from each other, the needle being adjustable to cause its inner extremity to occupy the body member or any one of the other substances for purposes of tone variation.

10 4. A holder for sound reproducing devices comprising a casing having a recessed body portion and a shell extending beyond the body portion and in which is located a number of substances varying in hardness, 15 the said substances being perforated to register with the recess of the body portion of the holder, and a shank adapted to pass through the perforations of the said substances and enter the recess of the body 20 portion of the holder, said shank being longitudinally adjustable for tone varying purposes substantially as described.

5. A needle holder for sound reproducing machines, equipped with a number of sub- 25 stances which the needle is adapted to engage, the outer portion of the said holder being provided with a layer of elastic material arranged to grip the needle.

6. A needle holder of the class described

including a hollow member containing a 30 number of substances varying in hardness or density and perforated to receive the needle, the outer portion of the holder being equipped with a layer of elastic material adapted to grip the needle when in place. 35

7. A needle holder for sound reproducing machines equipped with a substance which the needle is adapted to engage, the outer 40 portion of the said holder being provided with a layer of elastic material for the purpose set forth.

8. A holder for sound reproducing needles, said holder comprising a body member and another substance differing in density 45 or hardness from the material of the body member, the body member having a recess to receive the inner extremity of the needle and the other substance being perforated to register with said recess and so arranged 50 that the needle when in the recess of the body member passes through the perforation of said substance.

In testimony whereof I affix my signature in presence of two witnesses.

RICHARD H. VESEY.

Witnesses:

BESS MITCHELL,

A. EBERT O'BRIEN.

1,185,311.

SOUND RECORD,
#1,185,311-----L. C. Hahn,
Patented-May 30th, 1916.
Filed-April 16th, 1913.

L. C. HAHN.
SOUND RECORD.
APPLICATION FILED APR. 16, 1913.

1,185,311.

Patented May 30, 1916.

Fig. 1.

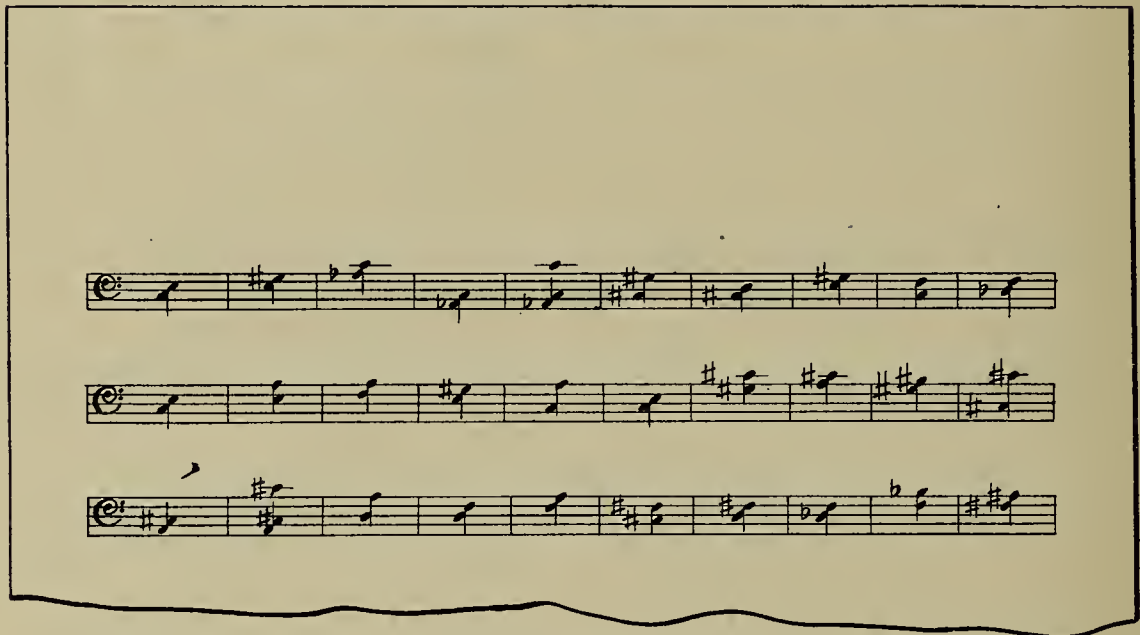
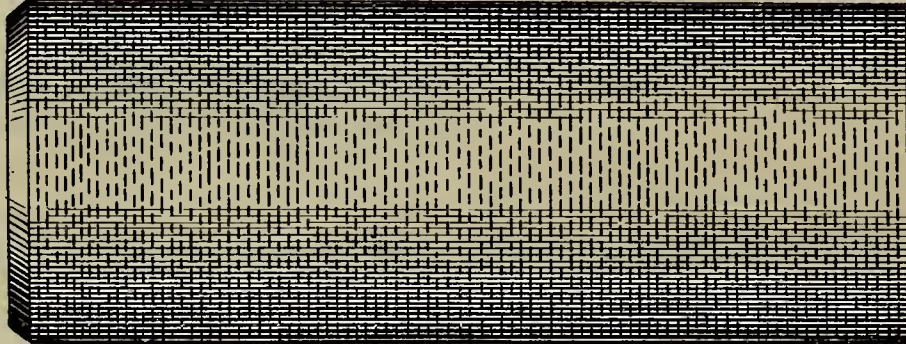


Fig. 2.

Laura C. Hahn

Witnesses

J. P. Toner
S. Wilkerson

Inventor,

by *C. A. Snow & Co.*
Attorneys.

UNITED STATES PATENT OFFICE.

LAURA C. HAHN, OF STURGEON BAY, WISCONSIN.

SOUND-RECORD.

1,185,311.

Specification of Letters Patent.

Patented May 30, 1916.

Application filed April 16, 1913. Serial No. 761,444.

To all whom it may concern:

Be it known that I, LAURA COCHEMS HAHN, a citizen of the United States, residing at Sturgeon Bay, in the county of Door and State of Wisconsin, have invented a new and useful Sound-Record, of which the following is a specification.

In the tuning of a pianoforte, or similar keyed musical instrument, to produce equal temperament, it is necessary that the tone intervals, namely, thirds, fourths, fifths and sixths, shall bear certain relations to each other, not only with reference to pitch, which is determined by the frequency and length of sound vibrations of the respective tones, but with reference to the frequency and length of "beats" or waves of sound which are distinguishable by the human ear, and which are due to the simultaneous occurrence or agreement at intervals of certain vibrations constituting said tones, or, as they may be termed, the nodal points of the two tones forming the particular tone interval which is being sounded.

By taking advantage of the fact that these beats, which are distinguishable to the ear when a given tone interval is sounded, must have a certain frequency in order to produce in the completed circle an equal temperament, it is possible to tune the circle of a keyed instrument by progressively sounding and justifying the tone intervals, and it is the object of my invention to provide a device by means of which these several tone intervals are sounded, or may be reproduced consecutively in the proper order of progression through the circle, to serve as a definite and invariable guide to the tuner of a musical instrument.

Assuming a pitch for small E and sounding therewith small C, major third below, the beats perceptible to the ear should agree with the ticks of an ordinary good movement watch, while said E sounded with small G sharp above, should produce beats at the rate about one-third faster. With one-lined C tuned smooth or without perceptible beat with small C, and tested with G sharp, the tenth below one-lined C and which, if correct, will be smooth or without perceptible beat, there is established a basis for the further tuning of the circle, wherein the tone interval G sharp—one-lined C will produce a beat one-third faster than the tone interval small E—G sharp. The interval small C sharp—G sharp, in practice,

should then be tuned a smooth or perfect fifth, so that the tone intervals small C sharp—E will beat the same as small E—G sharp, and then this fifth should be contracted by raising small C sharp to an extent sufficient to cause a two-beat reduction in the interval small C sharp—E, as compared with small E—G sharp.

In the same way, small C should be tuned a smooth fourth with small F, so that the tone interval small C sharp—F will have a beat of the same rate as small C—E, whereupon the fourth should be expanded by raising small F to substantially the same extent as the former fifth, small C sharp—G sharp, was contracted, and by proceeding progressively through the circle in this way, contracting the fifths and expanding the fourths, a circle of equal temperament can be produced.

In carrying out my invention, I have prepared a sound record having means, such as grooves, indentations or undulations, adapted when in use to reproduce respectively and consecutively these tone intervals, as for example, small C and E, small E and G sharp, small G sharp (or A flat) and C, small C and one-lined C (octave) with lower G sharp (tenth), small C sharp and G sharp, small C sharp and E, small E and G sharp, small C and F, small C sharp and F, and so on through the circle, each of the tone intervals as reproduced representing the correct frequency of beats for the guidance of the tuner. The record of these tone intervals, or the grooves, indentations or undulations of the sound record may be produced in any suitable or well known manner, as by recording devices of any of the well known types, exposed successively to sustained productions of the respective tone intervals produced by any instrument, or combination of instruments, tuned to the proper temperament, and in the accompanying drawing there is shown in—

Figure 1 a phonographic record cylinder wherein appear record grooves, each of which extends continuously around the cylinder, and each of which represents a given tone interval, whereby, when the needle of a reproducer is actuated thereby, the corresponding tone interval is sounded; Fig. 2 a diagram of a portion of a chart representing certain of the tone intervals represented by the record.

In practice, it is only necessary to ad-

just the speed of rotation of the record, to produce the desired pitch of sound for small octave E of the initial tone interval, after which the consecutive use of the tone records will result in a reproduction of the several tone intervals occurring in the circle, and after the completion of the circle, the instrument under manipulation can be tuned therefrom in both directions as to octaves, which, as in the ordinary instrument, may be shaded more or less to give the desired brilliancy to the upper registers and sonority to the lower registers.

What is claimed is:

1. A sound record adapted to assist in tuning pianofortes or similar keyed musical instruments which employ the modulated or equally tempered scale having audible representations of the tone intervals in the proper order of progression followed in tuning the instrument to the modulated or equally tempered scale.

2. A sound record adapted to assist in tuning pianofortes or similar keyed musical instruments which employ the modulated or equally tempered scale having audible representations of the modulated tone intervals in the proper order of progression followed in tuning the instrument to the modulated or equally tempered scale.

3. A sound record adapted to assist in tuning pianofortes or similar keyed musical instruments which employ the modulated or equally tempered scale having audible representations of the modulated tone intervals corresponding in wave frequency with the same tone intervals followed in tuning the instrument to the modulated or equally tempered scale.

4. A sound record adapted to assist in tuning pianofortes or similar keyed musical instruments which employ the modulated or equally tempered scale having audible representations in proper consecutive succession of the tone intervals sounding the pitch to be tuned and certain of its harmonic overtones, the succession of tone intervals audibly represented by the sound record constituting the circle of the tone intervals employed in tuning the instrument to the modulated or equally tempered scale, substantially as described.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

LAURA C. HAHN.

Witnesses:

SELINA WILLSON,

I. E. SIMPSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

..... DECOY,

#1,185,559-----A. C. Vaughan,
Patented-May 30th, 1916.
Filed-February 3rd, 1915.

A. C. VAUGHAN.

DECOY.

APPLICATION FILED FEB. 3, 1915.

1,185,559.

Patented May 30, 1916.

Fig. 1.

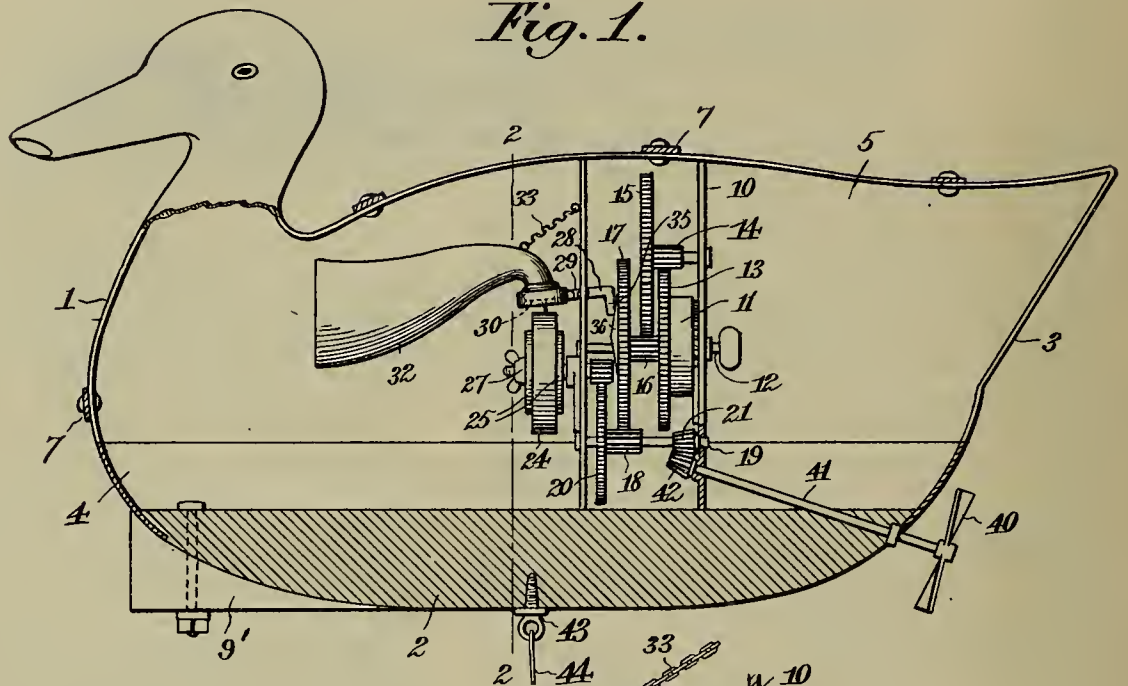


Fig. 2.

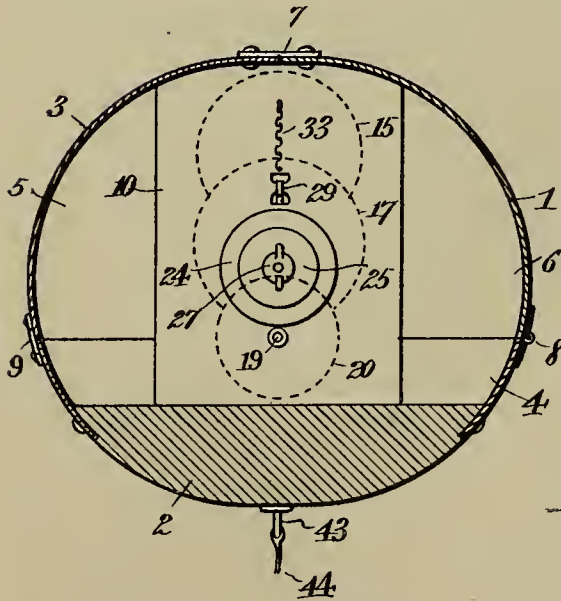


Fig. 3.

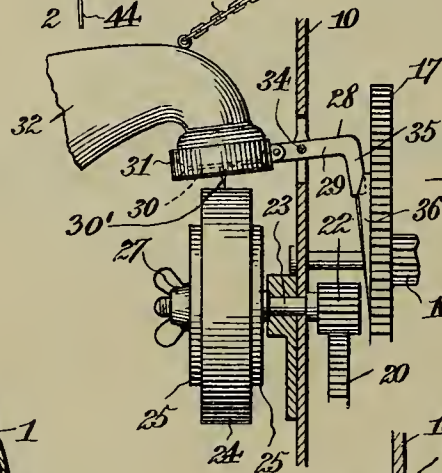
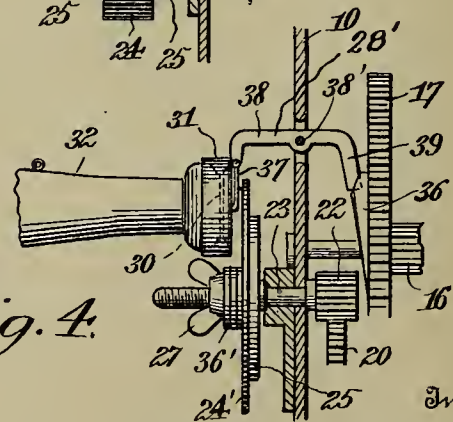


Fig. 4.



Inventor,
Amos C. Vaughan.

Witnesses: _____

C. Finkle, Jr.,
C. C. Limes.

By Victor J. Evans,
Attorney.

UNITED STATES PATENT OFFICE.

AMOS C. VAUGHAN, OF ANADARKO, OKLAHOMA.

DECOY.

1,185,559.

Specification of Letters Patent.

Patented May 30, 1916.

Application filed February 3, 1915. Serial No. 5,925.

To all whom it may concern:

Be it known that I, AMOS C. VAUGHAN, a citizen of the United States, residing at Anadarko, in the county of Caddo and State of Oklahoma, have invented new and useful Improvements in Decoys, of which the following is a specification.

This invention relates to mechanical decoys, such as are made in the form of ducks, geese, and other water fowl, adapted to give cries or calls in imitation of the natural fowl to serve as a lure whereby natural fowl are attracted.

The object of the invention is to provide a decoy of simple construction, embodying therein phonographic means for automatically giving at predetermined intervals a call or cry, and which may also move about in the water to simulate the motions of natural fowl.

The invention consists of the features of construction, combination and arrangement of parts herein fully described and claimed, reference being had to the accompanying drawing in which:—

Figure 1 is a vertical longitudinal section of a decoy, in the form of a duck, embodying my invention. Fig. 2 is a vertical transverse section on the line 2—2 of Fig. 1. Fig. 3 is a detail view on an enlarged scale, partly in section, showing more clearly the sound producing mechanism. Fig. 4 is a similar view of the mechanism as adapted for use in connection with a disk record instead of a cylinder record.

Referring to the drawing, 1 designates the body of the decoy, which may be made in simulation of a duck, goose, or other fowl or bird. This body is preferably hollow and composed of a bottom portion 2, of wood or other suitable material, and top portion 3 of sheet metal, canvas or other suitable material. The portion 3 includes a lower section 4 secured to the bottom 2, and an upper section formed of divided portions 5 and 6 rigidly united by suitable connecting elements 7. The portion 3 is hinged or pivoted at one side to one of the sides of the portion 4, as shown at 8, and is adapted to be secured at its opposite or free side to the other side of the portion 4 by any suitable type of fastening means, generally indicated at 9, the construction being such as to provide a body having relatively hinged or pivoted bottom and top sections adapted to be opened and closed for convenience in as-

sembling, cleaning and repairing the internal parts. The body is provided with an adjustable rudder 9', which may be set to guide the decoy or cause it to describe any desired circle upon the water.

Arranged within the body is a suitable frame structure 10 which supports a clock-work mechanism 11, including a winding shaft 12 and a primary drive gear 13 driven therefrom. The gear 13 drives a pinion 14 on a shaft with a gear 15 meshing with a pinion 16 on a shaft with a transmission gear 17. The transmission gear 17 in turn meshes with a pinion 18 on a driving shaft 19 carrying a spur gear 20 and a beveled gear 21. The gear 20 is arranged to rotate in a plane parallel with the gear 17 and meshes with a pinion 22 on a horizontal shaft 23, which is suitably journaled upon the frame structure 10 and is adapted to support the sound record of the phonographic mechanism. As shown in Figs. 1 and 2 a record cylinder 24 may be employed and secured between flanges or disks 25 and 25, the former being fixed to the shaft and the latter removable to permit of the application and removal of the record, the said removable flange or disk being secured in position by means of a clamping screw 27 fitted on a threaded extension of the outer end of the shaft.

Carried by the framework is a bell-crank shaped lever 28, which has an arm 29 connected with the sound box or casing of a reproducer 31, carrying a sound horn 32, the weight of the reproducer and horn being supported from the frame work 10 by a chain or other suitable supporting medium 33. The said arm 29 of the lever 28 is pivoted to the frame work 10, as at 34, so as to maintain the lever in a normally balanced position through the force of gravity. The stylus or needle 30' carried by the diaphragm 30 engages and is influenced by the sound groove of the record 24, which is of a proper character to vibrate the lever and diaphragm to give the proper call or cry. The other arm 35 of the lever 28 is arranged within the path of a controlling cam 36 on the outer face of the gear 19, which engages the arm 35 at intervals to tilt the lever thereby throwing the stylus or needle to an inoperative position, so that the calls or cries will be sounded with proper intervals of silence between them.

It will be evident from the foregoing de-

scription, that when the clock work mechanism is set into action the needle of the reproducing mechanism, which is normally in position for operation, will be vibrated by the rotating record and will actuate the sound diaphragm to give the call or cry, and that after one or more calls or cries are given the cam will render the needle inoperative for a predetermined period, so that the calls sounding, with the intervals of silence between calls, will closely simulate the calls or cries of the natural bird. It will of course be understood that the cam instead of throwing the stylus out of action may on the other hand throw the stylus into action in which event the lever will operate to hold the needle or stylus out of action.

Instead of employing a cylinder record, I may employ a disk record, as illustrated in Fig. 4, the record 24' being mounted upon the shaft 23 in place of the record 24 and secured in place by the aforementioned fastening means, one or more suitable washers 36' being employed to take up the space between the record and the flange 25. For use in conjunction with such a record, a lever 28' is employed which lever has a vertical stylus carrying arm 37 connected with the diaphragm, a horizontal arm 38 pivotally mounted upon the frame work as at 38', and a vertical arm 39, the latter being arranged to coöperate with the cam 36 for the purpose before described. It will be understood that this lever is pivotally balanced so as to be normally disposed and held by gravity in position for coöperation with the record, and that the lever is tilted and thrown at intervals from an active to an inactive position, during which period there is a cessation of actuation of the calling mechanism. It will, of course, be understood that in this case also the lever may be mounted so as to normally remain inactive and be periodically thrown into action by the cam, which variation falls within the spirit and scope of the invention.

It will be evident from the foregoing description that upon swinging the upper section of the body to an open position the clock work mechanism and working parts of the sounding or calling mechanism may be exposed, allowing the clock work mechanism to be conveniently wound and all the parts to be lubricated, cleaned, repaired or replaced whenever required.

A propeller 40 may be mounted at the rear of the body on a shaft 41 carrying a pinion 42 meshing with the gear 21 by

which the decoy may be propelled in a given path.

In practice the bottom 3 is provided with an eye bolt or other connection 43 to which may be attached a suitable weight or anchor 44, whereby the decoy will be prevented from drifting away while allowed to float upon the surface of the body of water.

When the decoy is in use, the propeller is set into action, and the rudder may be adjusted so that the decoy will move in a circumscribed circular path and will simulate the action of the natural fowl moving about upon the surface of the water. While so moving the call mechanism will be sounded at fixed intervals through the action of the clock work mechanism, as will be readily understood.

I claim:

1. A decoy including a hollow body having a sound escape outlet, a frame within the body, said frame including a plate having an opening therein, a lever pivotally mounted within an opening in the plate and having angularly disposed arms extending on opposite sides of said plate, a clock-work mechanism supported by the frame and including a transmission gear, a record holding shaft journaled upon and extending through said plate and driven at one end from said gear, a cam carried by the transmission gear for vibrating said lever and adapted for coöperation with one of the arms of the lever, and a sound producing device supported by the other arm of the lever and adapted for coöperation with a record supported by the record holding shaft.

2. A decoy including a hollow body having a sound escape opening, a frame within the body, a clock-work mechanism supported by the frame and including a transmission gear having a cam projection, a vibrating lever having oppositely projecting arms, one of said arms being adapted to be engaged by the cam, whereby the lever is vibrated upon its pivotal connection, a sound producing mechanism supported by the other arm of the lever, a shaft in gear with the transmission gear and adapted to support a sound record, and means for securing the sound record thereon.

In testimony whereof I affix my signature in presence of two witnesses.

AMOS C. VAUGHAN.

Witnesses:

R. M. PELL,
JOHN BRUSH.

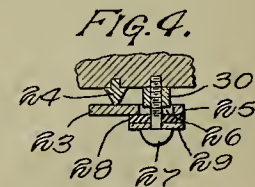
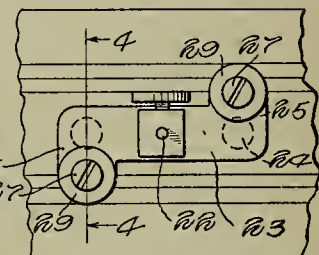
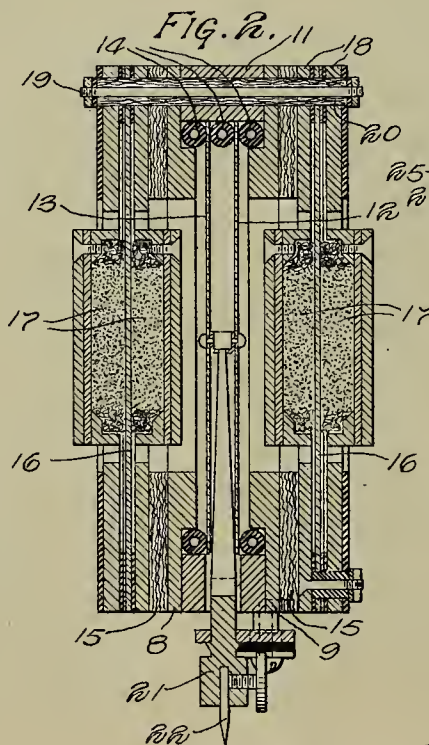
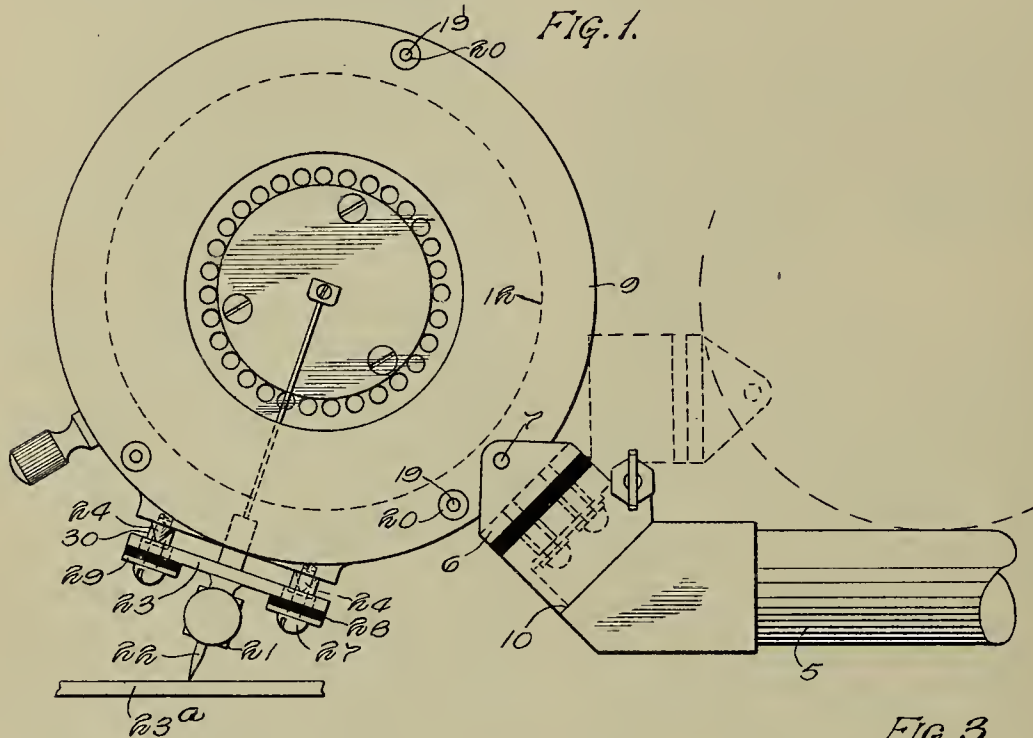
GRAPHOPHONE PATENT.

REPRODUCING AND TRANSMITTING APPARATUS,
#1,185,877-----J. J. Comer,
Patented-June 6th, 1916.
Filed-January 27th, 1912.

J. J. COMER.
REPRODUCING AND TRANSMITTING APPARATUS.
APPLICATION FILED JAN. 27, 1912.

1,185,877.

Patented June 6, 1916.



WITNESSES
A. Andersen,
Geo. F. Schmidt

INVENTOR:
John J. Comer
By Bulkeley & Durand
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN J. COMER, OF CHICAGO, ILLINOIS, ASSIGNOR TO AUTOMATIC ENUNCIATOR COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

REPRODUCING AND TRANSMITTING APPARATUS.

1,185,877.

Specification of Letters Patent.

Patented June 6, 1916.

Application filed January 27, 1912. Serial No. 673,941.

To all whom it may concern:

Be it known that I, JOHN J. COMER, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improving in Reproducing and Transmitting Apparatus, of which the following is a specification.

My invention relates to an improved reproducing and transmitting apparatus, and is particularly adapted for reproducing the vibrations received from a record, and then transmitting these vibrations to a distant point where they are reproduced into articulate sounds.

My invention is especially useful in connection with reproducing musical sounds from a phonograph record. In such apparatus very careful and delicate adjustment and construction are necessary in order to obtain a clear reproduction of the music from the record. It is necessary that extraneous vibrations be entirely eliminated. It is furthermore necessary that the vibrations of the diaphragm be controlled in such manner that this diaphragm does not have any false vibrations. Heretofore the diaphragm has either been uncontrolled, in which case these false vibrations were bound to occur, or else the diaphragm has been controlled by metallic springs. In this last instance, while the false vibrations of the diaphragm were eliminated, still the presence of the metallic springs caused a metallic sound which was very objectionable.

One of the important features of my invention is to entirely eliminate these objectionable features, by providing non-metallic controlling means for the diaphragm by which all extraneous vibrations are eliminated, and in which this objectionable metallic sound is avoided.

A further feature of my invention is the improved manner of mounting the microphone transmitter, so that the variable resistance material is affected solely by the vibrations received from the record and in which these microphones are not affected by other extraneous vibrations.

A still further feature of my invention is in the manner of mounting the reproducing and transmitting apparatus. In this class of apparatus in which the needle supports the transmitting box, it has been found that in

order to get the best results the weight actually supported by the needle should not be more than four and one-half ($4\frac{1}{2}$) ounces. As my apparatus is heavier than this, I so support it on this arm that this supported arm partially carries the weight of the transmitting box, the amount left for the needle to support being substantially four and one-half ($4\frac{1}{2}$) ounces.

A further feature is in having the transmitting apparatus so mounted that it may be turned upward so as to bring the needle into position whereby it can be more readily changed. This upsetting of the transmitter box is also advantageous as it prevents the carbon from packing.

These and other objects and features of my invention will be more readily understood by having reference to the accompanying drawings, in which—

Figure 1 is a side elevation of my apparatus with one of the microphone transmitters and the associated felt packing removed in order to more clearly show the manner in which the mounted arm is secured to the apparatus. Fig. 2 is a cross sectional view of the complete apparatus. Fig. 3 is a detail bottom view. Fig. 4 is a sectional view taken on line 4—4 in Fig. 3.

I have illustrated a supporting arm 5 having an upturned end portion 6 to which the disks 8 and 9 of the transmitting apparatus are pivoted at the point 7. This supporting arm 5 is likewise provided with a knuckle joint 10. By this means the transmitting apparatus can first be swung about the pivot point 7, and then by means of this knuckle joint 10 the transmitting apparatus can be swung back so as to rest upon the upper side of the supporting arm in the manner shown in dotted lines in Fig. 1. By this construction the needle is brought into position whereby it can be readily changed. And, furthermore, the carbon of the microphone, to be hereinafter described, is upset so as to prevent packing.

The transmitting apparatus consists of the disks 8 and 9, before described, between which is located the connecting ring 11. The diaphragms 12 and 13 are likewise mounted between these disks by means of the rubber rings or washers 14 in a manner which will be readily understood by reference to Fig. 2 of the drawings. Located

upon the outside of each of the disks 8 and 9, there is a microphone transmitter. Each of these transmitters are separated from the respective disk by means of a felt packing 15. The two microphones are similar in construction and consist of the diaphragm 16 upon opposite sides of which are mounted bodies of granular material 17. This granular material covers the central portion of the diaphragm while the marginal portions are surrounded by a restricted air space formed by the clamping plates 18.

The particular type of transmitter employed is not an essential feature of my present invention, although I have found that very efficient results are obtained by means of the transmitter here shown and described. The parts are held together by means of three through bolts 19. These bolts are surrounded by a felt packing 20. By this construction—that is, by the employment of the felt packing 15 between the disks 8 and 9 and the microphone transmitter, and by means of the felt packing about the through bolt 19—I provide a very efficient construction, as by this means it is practically impossible for the diaphragm 16 of the microphone transmitters to be vibrated by any foreign or extraneous vibrations of the disks 8 and 9. The use of this felt packing provides a very loose and flexible connection between these parts, so that the vibrations of the diaphragm are entirely caused by the vibrations received through the air from the diaphragms 12 and 13.

Located between the diaphragms 12 and 13, and secured thereto, there is mounted the reproducing arm 21. This arm is provided at its lower end with a socket for holding the needle 22 in the usual manner. This needle 22 is adapted to traverse a grooved record, such as shown at 23^a in Fig. 1, and to be vibrated laterally thereby. Mounted upon this reproducing arm is a bearing plate 23, which bearing plate pivots on two trunnion points 24. If this reproducing arm, which is connected to the diaphragms 12 and 13, was allowed to vibrate freely, the rapid vibrations would tend to set up false vibrations in the diaphragm and the arm, and thus interfere greatly with the clear and exact transmission of the music or other sounds from the record. In order to avoid this, I provide means for controlling the vibrations of this reproducing arm, whereby the vibrations can be slightly damped, and thus these extraneous vibrations eliminated. This control is accomplished in the following manner: The bearing plate 23 is provided at its ends with laterally extending ears 25, these ears extending in opposite directions, in the manner clearly shown in Fig. 4. In the end of these ears there is

a circular opening 26; passing through this opening there is a screw bolt 27, which bolt is separated from the plate 23 by means of the rubber washer 28. I have likewise shown a second washer 29 located between the head of the bolt and the rubber washer 28, although it is not necessary that this second washer be of non-metallic material. A lock nut 30 is mounted on the bolt 27, so as to lock this bolt in any desired position. It will be noticed that the opening 26 is of sufficient dimension so that the lock nut does not touch the bearing plate 23 at any point. By this construction it will be noticed that by adjusting the bolt 27 the rubber washer 28 can be made to bear with greater or less pressure upon the laterally extending ears of the bearing plate 23. This pressure is so adjusted as to damp the vibrations of the reproducing arm to the proper extent. As this arm is vibrated on the trunnion points 24, the ears 25 move toward and away from the rubber washer 28, this washer being of sufficient flexibility to permit of this slight vibration of the bearing plate caused by the record. While I have shown a rubber washer, and obtained very efficient results with such a construction, it is obvious that, if desired, very good results might be obtained with other non-metallic substances, such as felt or leather. It is essential, however, that no metal touch the vibrating arm, as any such metal will cause an objectionable metallic sound.

While I have illustrated one specific embodiment of my invention, and one in which the vibrations received from the record are transmitted electrically to a distant point, it is to be understood that in certain broader aspects my invention is not limited to such use. It is obvious that my non-metallic control for the reproducing arm could be as well applied to apparatus in which the reproduction is entirely by mechanical means. Likewise while I have shown my reproducing arm in connection with a pair of diaphragms, it is to be understood, of course, that very efficient results can be obtained with but a single diaphragm. Many other changes and modifications will readily suggest themselves, and I consider these within the scope broadly of my invention.

What I claim as my invention is:

1. In a sound reproducing apparatus, a vibrated diaphragm, a microphone located adjacent to said diaphragm, a felt packing between said microphone and said diaphragm, through bolts for securing said microphone and diaphragm together, and felt packing surrounding said through bolts.

2. In a sound reproducing apparatus, a diaphragm, a pair of microphone transmitters located on opposite sides of said diaphragm, felt packing located between said transmitters and said diaphragm, through

bolts for securing said microphones and diaphragm together, and felt packing surrounding said through bolts.

3. In a sound reproducing apparatus, the
5 combination of a pair of vibrated diaphragms, a common supporting ring in which said diaphragms are mounted, a microphone located on each side of said common supporting ring, a ring of felt located
10 between said supporting ring and each of

said microphones, and means clamping said supporting ring, microphones and felt rings together in a unitary structure.

Signed by me at Chicago, Illinois, this
24th day of January 1912.

JOHN J. COMER.

Witnesses:

H. A. SWENARTON,
E. H. CLEGG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

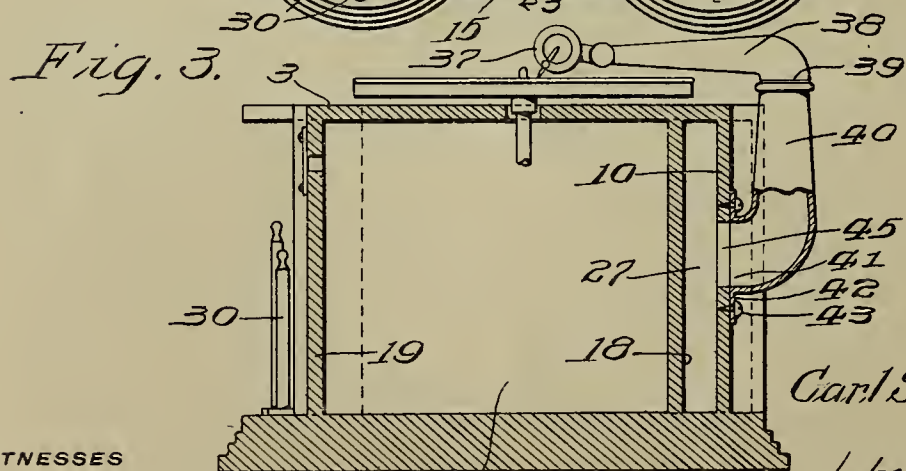
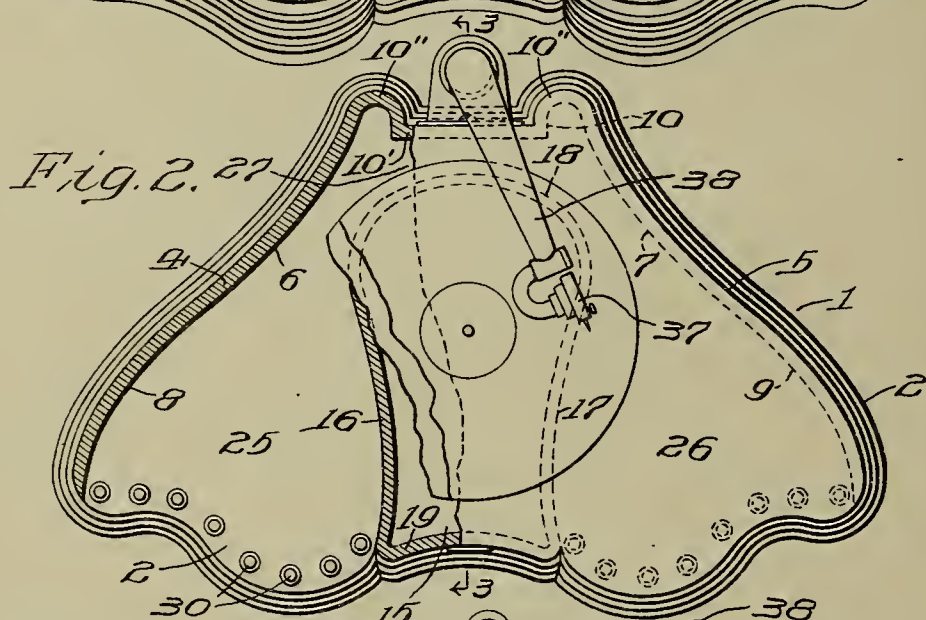
THE HISTORY OF THE
CITY OF LONDON
FROM THE FOUNDATION
TO THE PRESENT
BY
JOHN STOW
1618

THE HISTORY OF THE
CITY OF LONDON
FROM THE FOUNDATION
TO THE PRESENT
BY
JOHN STOW
1618

TALKING MACHINE,
#1,185,945-----C. Schroeter,
Patented-June 6th, 1916.
Filed-September 5th, 1913.

1,185,945.

Fig. 1. 36 38 36' 35 1 29 5 28 4 16 17 30 19 2 10" 10"



WITNESSES

F. J. Hartman.

A. J. Gardner

INVENTOR
Carl Schroeter

ATTORNEY

UNITED STATES PATENT OFFICE.

CARL SCHROETER, OF BERLIN, GERMANY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,185,945.

Specification of Letters Patent.

Patented June 6, 1916.

Application filed September 5, 1913. Serial No. 788,198.

To all whom it may concern:

Be it known that I, CARL SCHROETER, a subject of the Emperor of Germany, and a resident of the city of Berlin, Germany, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

The main objects of this invention are to provide an improved talking machine of simple, compact, and efficient construction; to provide improved sound amplifying means; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a perspective view of a talking machine constructed in accordance with this invention; Fig. 2 a fragmentary top plan view partially in horizontal section of the same; and Fig. 3 a fragmentary side elevation, partly in vertical central longitudinal section on line 3—3 of Fig. 2.

Referring to the drawings, one embodiment of this invention consists of a talking machine, including an external or main cabinet or casing 1, comprising a substantially flat comparatively thick and rigid horizontal base or bottom wall 2, which may be of any suitable form, but which, in planular outline, preferably tapers or flares from one end toward its opposite end, and is preferably approximately in the form of a truncated triangle, and bounded mainly by curved lines to conform to the shape of the vertical walls hereinafter described, and to give a graceful appearance to the cabinet. Spaced above and in vertical alinement with the base 2 is a flat horizontal wall 3 of approximately the same planular dimensions and shape as the base 2, but of a smaller thickness, which forms the top wall of the main casing.

Connecting the base 2 and the top wall 3, and rigidly secured thereto and extending along the marginal side edges thereof respectively, are two forwardly diverging transversely vertical walls 4 and 5 forming the side walls of the main casing. Each of these side walls 4 and 5 is preferably of substantially uniform thickness throughout substantially its entire length and extends longitudinally, preferably in the form of a compound curve, the two side walls being arranged symmetrically with respect to the longitudinal axis of the main casing, and preferably flaring from the rear edge of the

base 2 forwardly. The inner portions of the inner surfaces of the side walls are preferably longitudinally convex, as at 6 and 7 respectively, and the outer portions of the inner surfaces of the side walls are preferably longitudinally concave as at 8 and 9 respectively, the convex portion of the inner surface meeting the concave portion of the inner surface about midway of the length of the side wall in each instance.

The two side walls 4 and 5 are connected along the rear edge of the base 2 by a vertical rear wall 10 which extends from the upper surface of the base 2 to the under surface of the top wall 3 and is rigidly secured to the base and top wall. This back wall 10 is preferably of substantially uniform thickness and comprises a main central, substantially flat vertical portion 10' which is preferably spaced slightly in the front of the rear edges of the side walls 4 and 5, and is substantially perpendicular and symmetrical with respect to the longitudinal axis of the main casing. This central portion 10' is connected to the rear edges of the side walls 4 and 5 by the interiorly concave approximately semicylindrical portions 10'' which extend rearwardly from the flat portion 10' forming the rear ends of two sound amplifiers or of a duplex sound amplifier, as will appear hereinafter.

Arranged symmetrically within the external or main casing 1 and spaced from the side walls 4 and 5 and the back wall 10 thereof, to form therewith a duplex sound amplifier, as will appear hereinafter, is an internal or secondary casing 15. This secondary casing may be of any suitable shape, but, to cooperate effectively with the main casing in amplifying sounds, is preferably substantially pear-shaped in planular outline, and comprises a continuous transversely vertical wall, curved longitudinally in horizontal section and extending vertically from the top surface of the base 2 to the under surface of the top wall 3 of the main casing, and rigidly secured thereto to form the opposite sides 16 and 17, and the inner end 18 of the secondary casing. The inner end wall 18 is preferably substantially semi-elliptical in horizontal section. The sides 16 and 17 of the secondary casing preferably converge slightly forwardly from their inner ends and then diverge slightly and at their front ends terminate approximately flush with the front

edge of the base 2. The front edges of the side walls 16 and 17 are connected by a transversely vertical wall 19, preferably curved longitudinally in horizontal section, and exteriorly concave, forming the front end of the secondary casing. This vertical front wall 19 is preferably slightly less in width than the back wall 18 of the secondary casing, and extends from the upper surface of the base 2 to the under surface of the top wall 3 and is rigidly secured to the base 2 and top wall 3. The outer portions of the sides 16 and 17 of the secondary casing are preferably exteriorly concave in horizontal section and curved horizontally to correspond with the horizontally curved outer portions 8 and 9 of the inner surfaces of the side walls 4 and 5 of the exterior casing respectively, to form therewith the outer portions of the side walls of the delivery ends or major portions of two forwardly diverging sound amplifiers 25 and 26, which communicate adjacent their inner or inlet ends through the passage 27 between the back wall 10 of the main casing and the back wall 18 of the secondary casing, the side walls 8 and 16, 9 and 17 of these sound amplifiers 25 and 26 being, in the instance illustrated, substantially symmetrical with respect to the longitudinal axes of the sound amplifiers 25 and 26 respectively.

The arrangement and construction of the walls of the main casing and of the secondary casing are such that two spaced outlets 28 and 29, are formed in the front of the main cabinet for the two sound amplifiers 25 and 26 respectively. These outlets 28 and 29, in the instance illustrated, are substantially rectangular and square in elevation or outline, and are separated by the front vertical wall 19 of the secondary casing. The front edges of the base 2 and top wall 3 may be curved gracefully and symmetrically in opposite directions from the front wall 19 of the secondary casing to meet the front edges of the side walls 4 and 5 of the main casing, and may be curved centrally to conform to the curvature of the front wall 19 of the secondary casing.

To enhance the sounds delivered by the amplifiers, and to provide a screen for each amplifier, the outlet of each amplifier is provided with a plurality of vertical horizontally spaced sounding posts 30, the lower ends of which are secured to the upper surface of the base 2 of the main cabinet, preferably in a row close to and following the contour of the front edge of the base, and the upper ends of which terminate at points spaced at different distances beneath the top wall 3 of the main cabinet, the posts 30 being of different lengths to vibrate sympathetically in response to various tones.

For reproducing sounds there is arranged slightly above the top wall 3 of the

main casing, a horizontal disk record support 35 which is mounted to rotate upon the upper end of a spindle 36 which projects downwardly through the central portion of the top 3, and into the space surrounded by the secondary casing and is actuated by a motor (not shown) arranged within the secondary casing. Arranged above the record support 35 to cooperate with a sound record 36' upon the support, is any suitable sound box or sound reproducer 37 which is connected to and communicates with the smaller end of a hollow tapering tone arm 38. The tone arm 38 extends rearwardly in a substantially horizontal direction throughout the greater portion of its length and then curves downwardly and terminates in a substantially circular downwardly facing open end 39 which communicates with the upper end of a downwardly flaring hollow bracket 40, the lower portion of which terminates in a forwardly facing open lower end 41 provided with an outwardly extending flat vertical flange 42, and is rigidly secured to the outer surface of the flat vertical central portion 10' of the back wall 10 of the main casing by means of screws 43 extending through the flange 42. The lower end of the bracket 40 registers with an inlet aperture 45 provided therefor in the central portion of the back wall 10 of the main casing and communicates laterally through this inlet 45 with the space 27 connecting the smaller or inlet ends of the major portions of the two sound amplifiers, or duplex sound amplifiers, 25 and 26. The tone arm 38 is arranged to swing about a vertical axis coincident with the longitudinal axis of the upper end of the bracket 40, so that the smaller end of the tone arm 38 will travel across the record 36' to permit the sound box to cooperate therewith in reproducing sounds.

Although only a single form has been illustrated in which this invention may be embodied, it is evident that the invention is not limited to the specific form disclosed, but might be embodied in other forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. In a talking machine, the combination of a main casing having a rear wall and reversely curved side walls, a secondary casing within said main casing extending vertically the full height of the interior of said casing and having a rear wall spaced from the rear wall of said main casing and forming therewith a sound passage, and having reversely curved side walls spaced from the side walls of said main casing and forming therewith two diverging sound amplifiers pear-shaped in longitudinal section, sound reproducing

means, and a sound conduit communicating with said sound reproducing means and communicating with said sound passage within said main casing through the said rear wall of said main casing.

2. In a talking machine, the combination of a main casing in planular outline approximating the form of a truncated triangle and having a rear wall and side walls, a secondary casing within said main casing and forming a motor compartment, said secondary casing having a rear wall spaced from the rear wall of said main casing and forming therewith a sound passage, and having side walls spaced from the side walls of said main casing and forming therewith two diverging sound amplifiers substantially pear-shaped in longitudinal section, sound reproducing means, and a sound conduit communicating with said reproducing means and communicating with said sound passage within said main casing through the rear wall of the main casing.

3. In a talking machine, the combination of a main casing in planular outline generally approximating the form of a truncated triangle and having a rear wall and reversely curved constantly diverging side walls, a secondary casing within said main

casing and forming a motor compartment, said secondary casing having a rear wall spaced from the rear wall of said main casing and forming therewith a sound passage, and having reversely curved side walls spaced from and substantially symmetrical to the side walls of said main casing and forming therewith two diverging sound amplifiers having their smaller ends curving into said sound passage, sound reproducing means, and a sound conduit communicating with said reproducing means and communicating with said sound passage within said main casing through the rear wall of the main casing.

4. In a talking machine, the combination with a main casing, of a secondary casing forming with said main casing two diverging sound amplifiers, sound reproducing means communicating with both of said amplifiers and a plurality of sounding posts of different lengths rigidly mounted at one end in said main cabinet and extending across the discharge end of said amplifiers.

Berlin, 12th day of August, 1913.

CARL SCHROETER.

Witnesses:

WOLDEMAR HAUPT,
HARIBWIG O. NEUBAUER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

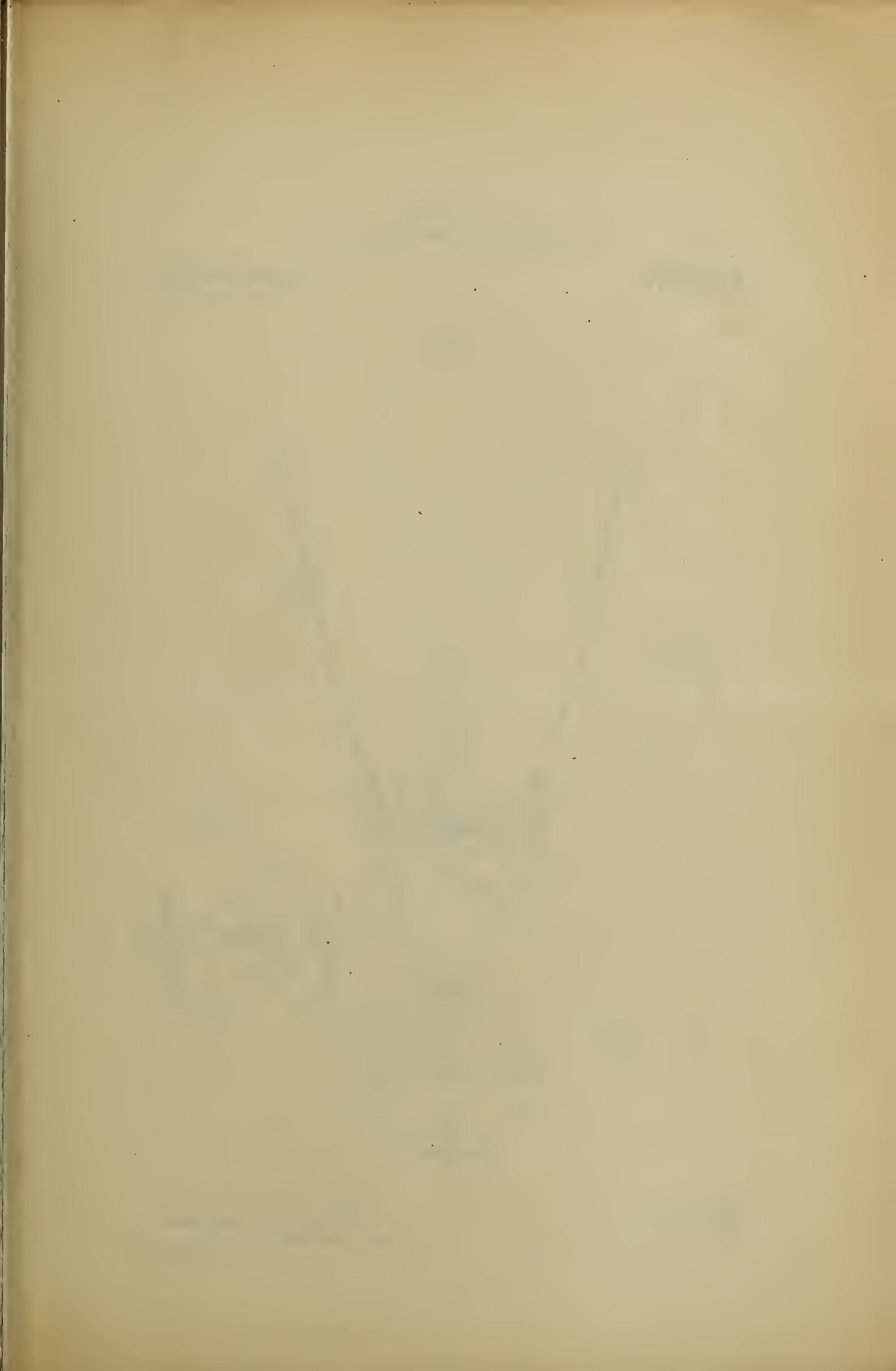
LIGHT AND SOUND DISTRIBUTING APPARATUS.
#1,185,987-----G. E. Emerson,
Patented-June 6th, 1916.
Filed-July 15th, 1913.

1,185,987.

Fig. 1

Witnesses:
Robert E. Samuel
John Jessick.

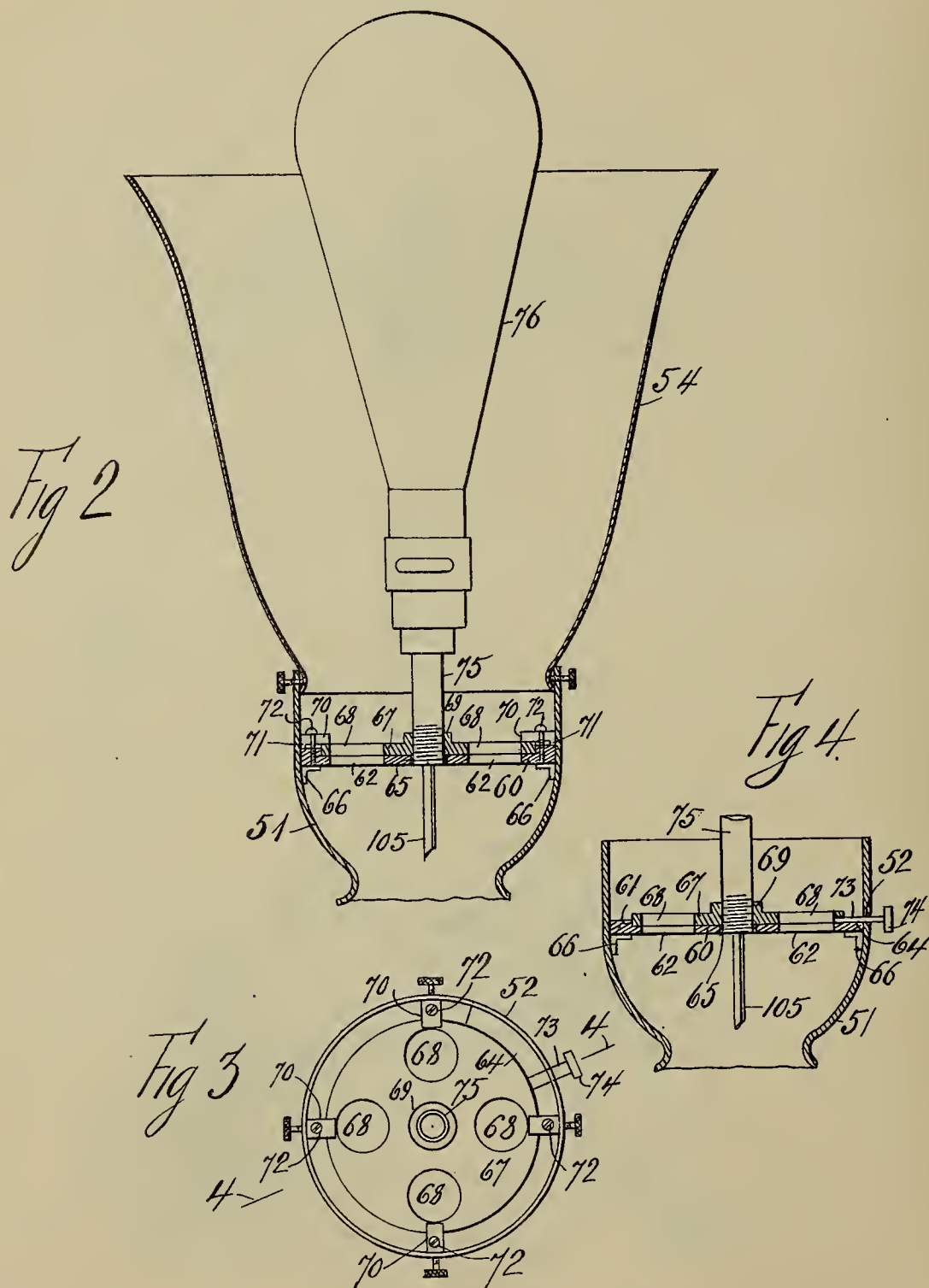
Inventor
George E. Emerson
By his Attorney
A. A. Bonnevill



G. E. EMERSON.
 LIGHT AND SOUND DISTRIBUTING APPARATUS.
 APPLICATION FILED JULY 15, 1913.

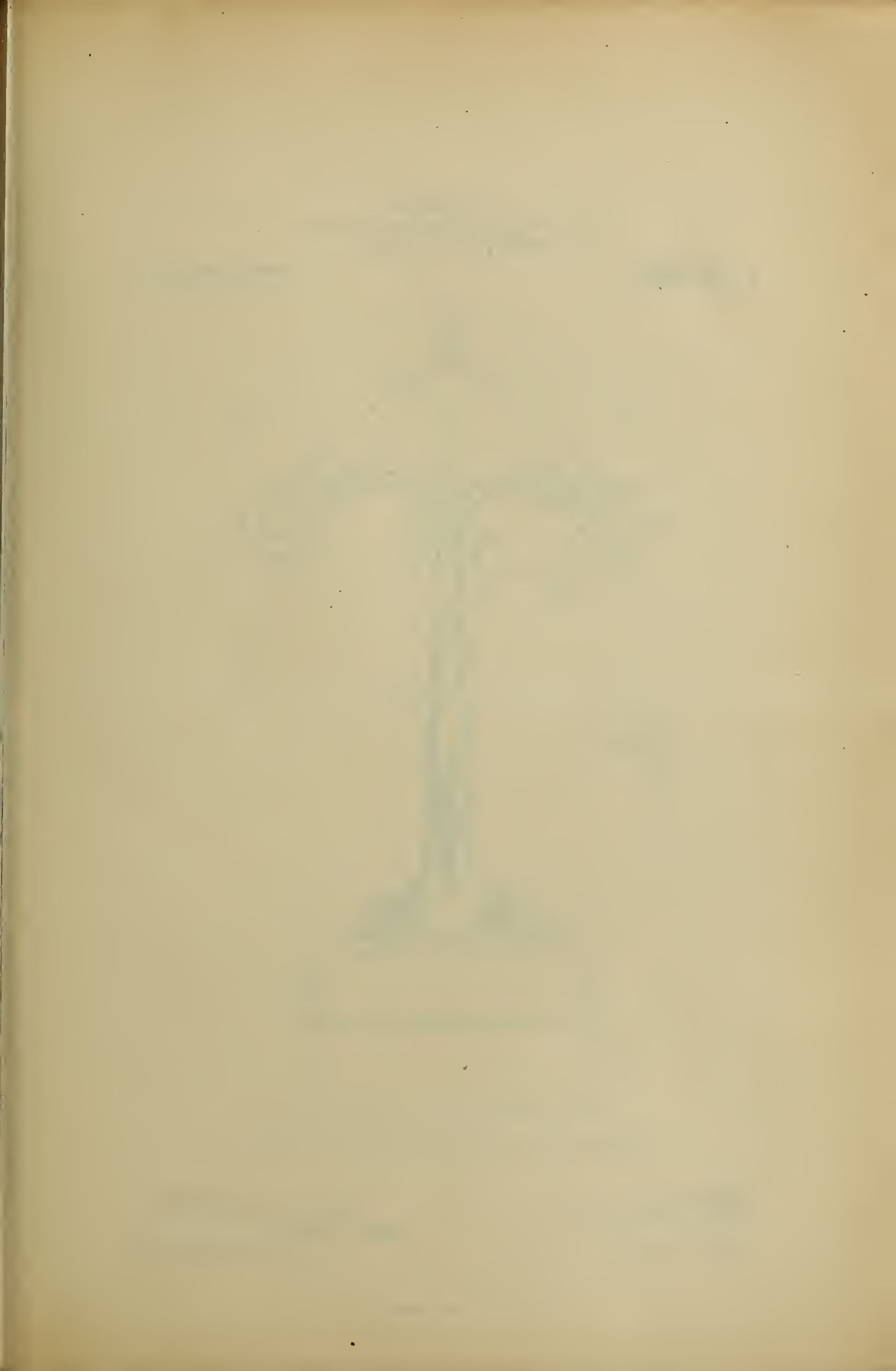
1,185,987.

Patented June 6, 1916.
 6 SHEETS—SHEET 2.



Witnesses:
 Robert E. Samuel.
 John J. J. J.

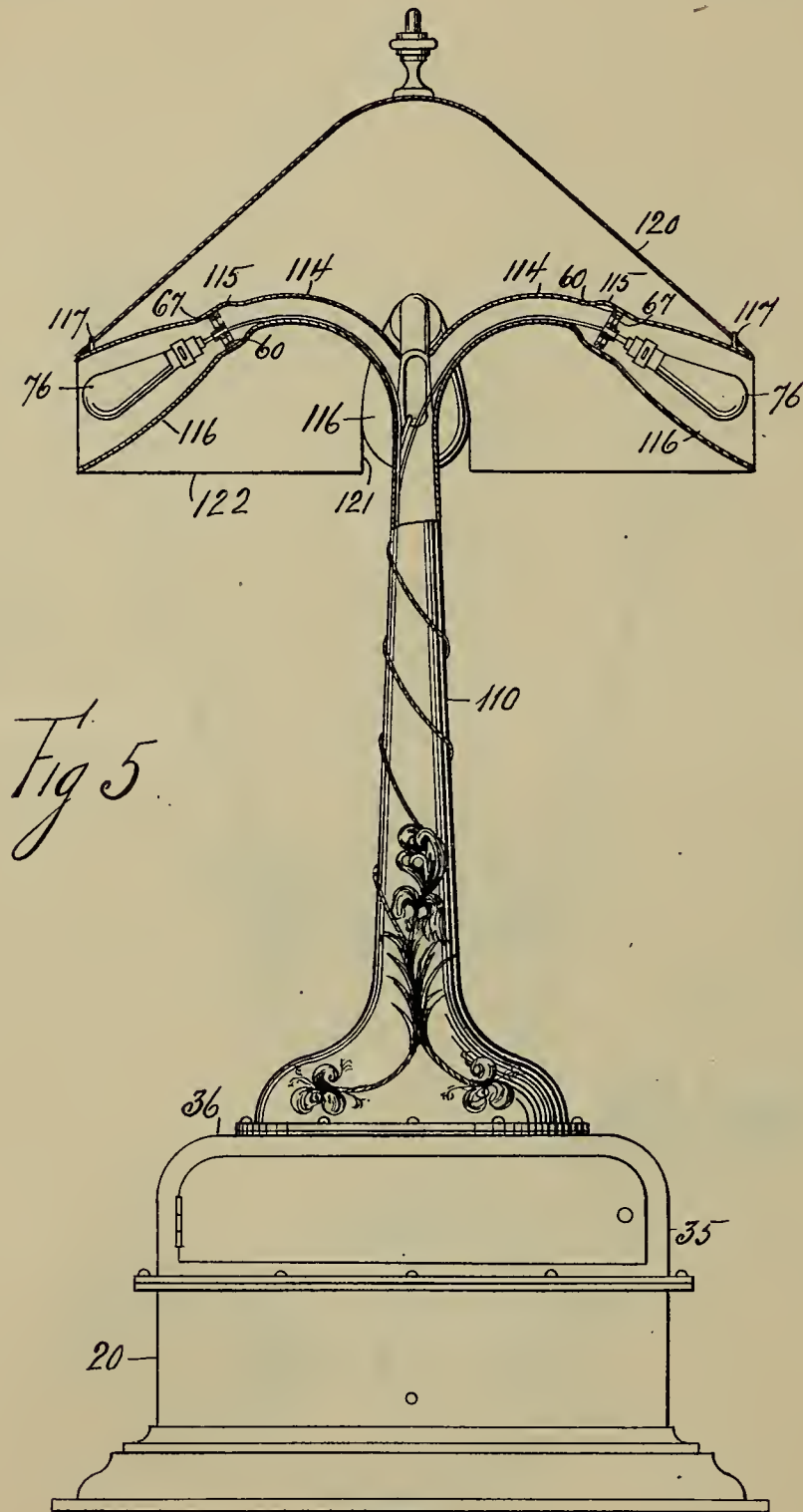
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G. E. EMERSON.
 LIGHT AND SOUND DISTRIBUTING APPARATUS.
 APPLICATION FILED JULY 15, 1913.

1,185,987.

Patented June 6, 1916.
 6 SHEETS—SHEET 3.



Witnesses:
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 John Jessick.

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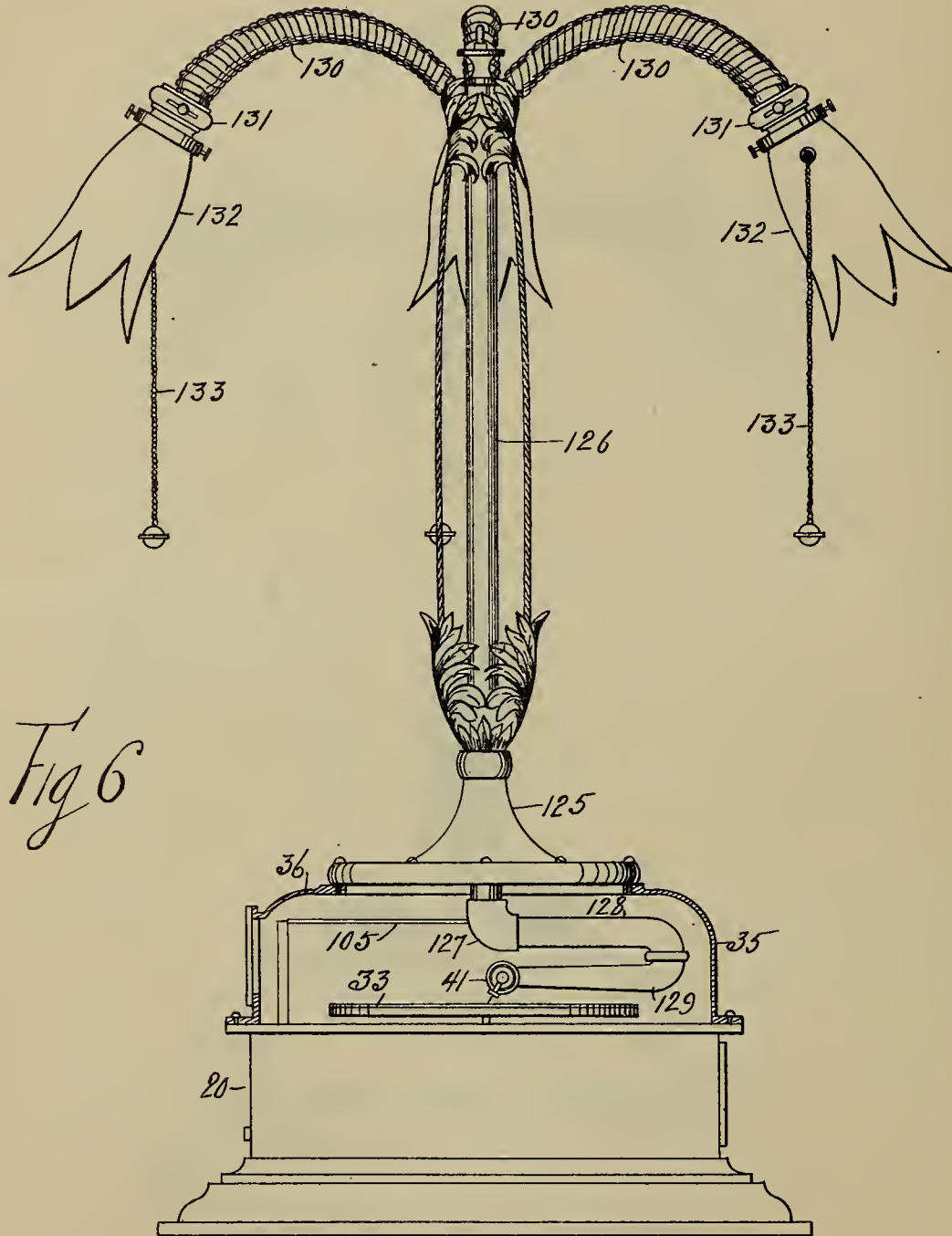


Fig 6

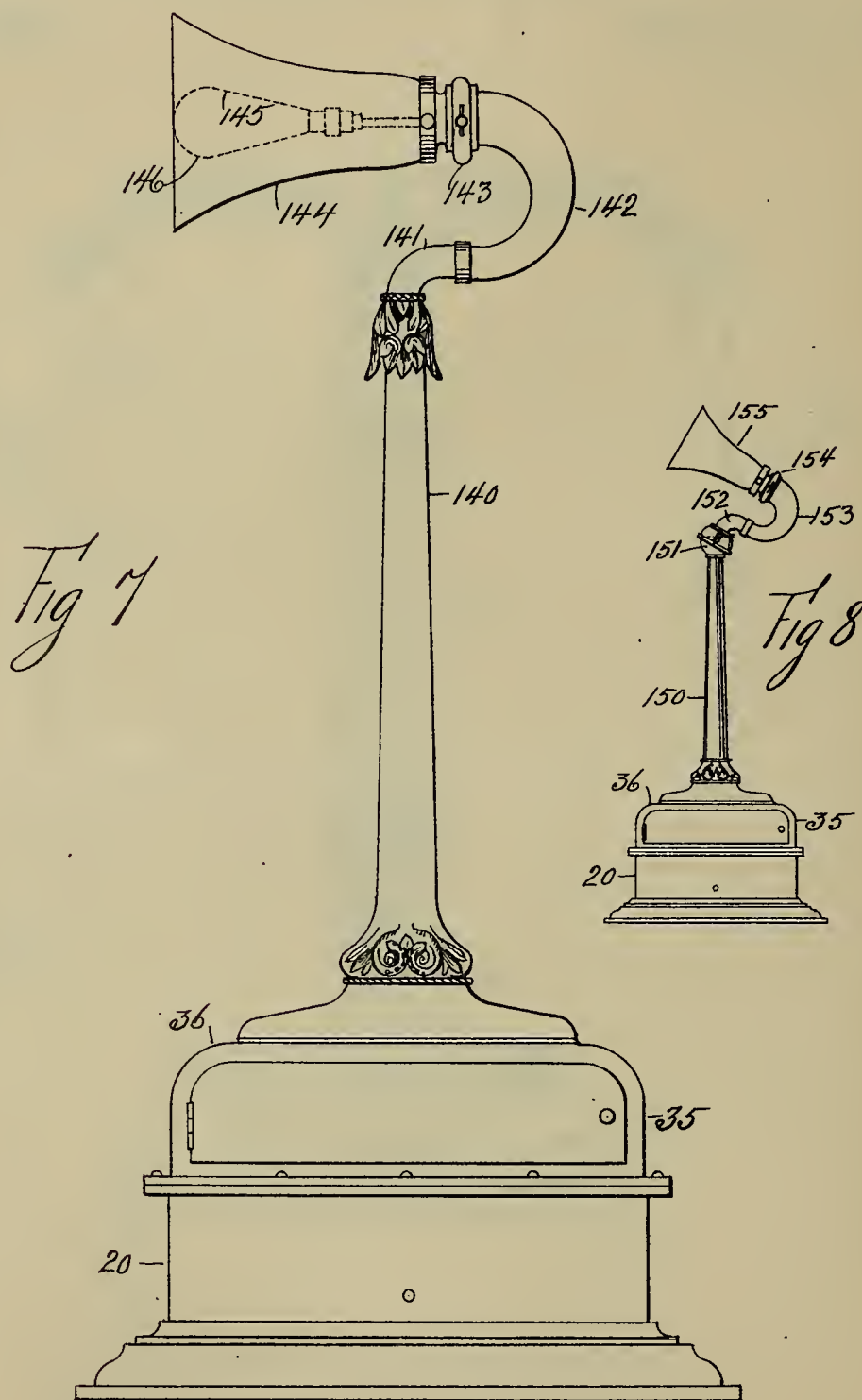
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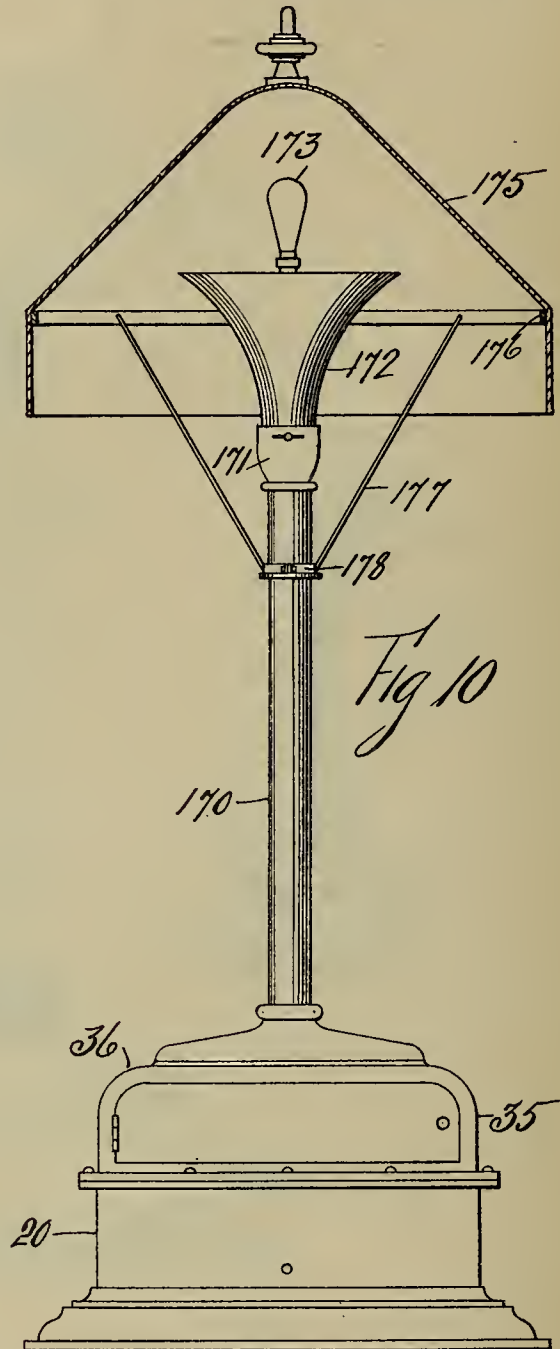
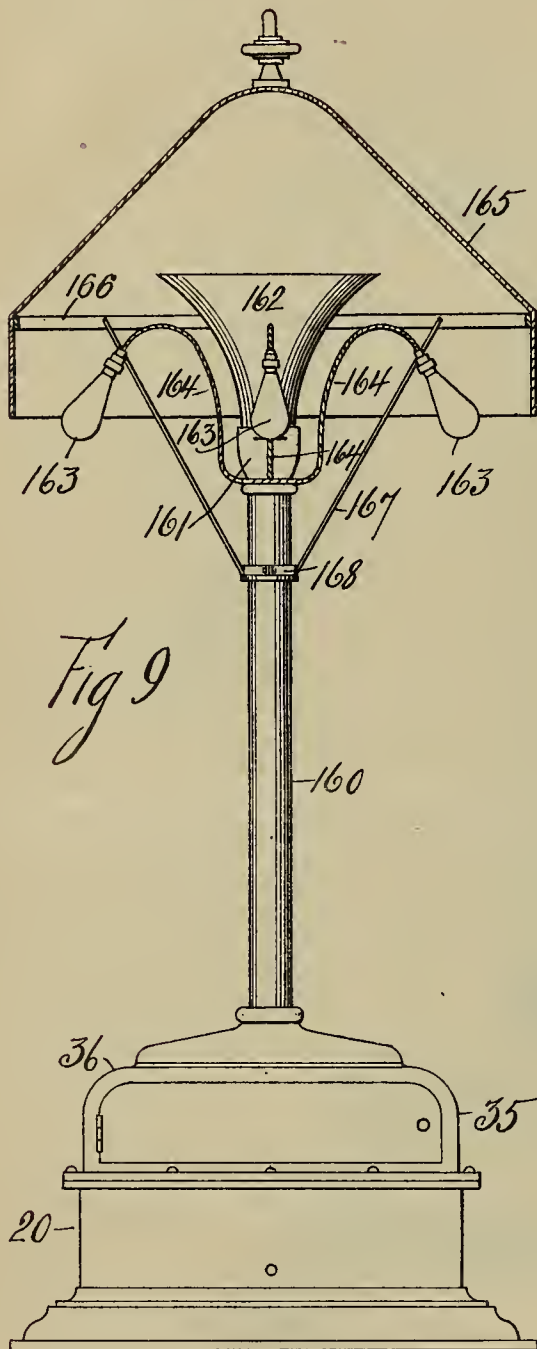
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 6 SHEETS—SHEET 6.



Witnesses:
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UNITED STATES PATENT OFFICE.

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TO EMERSON PHONOGRAPH COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION
OF NEW YORK.

LIGHT AND SOUND DISTRIBUTING APPARATUS.

1,185,987.

Specification of Letters Patent.

Patented June 6, 1916.

Application filed July 15, 1913. Serial No. 779,101.

To all whom it may concern:

Be it known that I, GEORGE E. EMERSON, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Light and Sound Distributing Apparatus, of which the following is a specification.

This invention relates to light and sound distributing apparatus.

The organization of the invention comprises means for producing sound waves, said sound waves coacting with the heat of light rays, produced by the appurtenances of the invention, and from which results a distribution of the said sound waves.

The invention assumes the form of a piece of artistic furniture, and specifically comprises a sound producing apparatus coacting with the heat resulting from a source of light, preferably a lamp, the lamp generally consisting of an electric bulb, although other sources of light may be used. The lamp is positioned to coact with the sound waves produced by the apparatus without interfering with the vibrations thereof.

Some of the forms in which the invention may be embodied are shown and described in this application, although the disposition of the elements shown, may be varied in numerous ways without departing from the invention.

The source of light or lamp of the invention is surrounded by an envelop of heated air, the hottest layer being adjacent to the lamp, and the temperatures of the layers decreasing with their distance from the lamp. The velocity of sound increases with the temperature of the transmitting medium, the velocity increasing at about the rate of 23.9 inches with one degree centigrade. The end of the sound wave nearest to the lamp travels faster than the portion more distant from the lamp. The direction of advance of the sound wave before entering the unequally heated mass of air surrounding the lamp is parallel to the axis of the lamp, and variably heated strata of air about the lamp cause a turning of the sound wave, so that the direction of advance thereof is diverged from the axis of the lamp, thereby producing a distribution of the sound waves.

In the various forms of the invention shown and described, in which the source of

illumination consists of a lamp within the sound duct or horn of the apparatus, the lamp is separated or stepped off from the latter, so that the advance of the sound waves is not obstructed. When a lamp shade is used it is preferably made of a translucent material that will reverberate from the effects of the sound waves impinging thereon, and thereby perform the functions of a sound horn.

Referring to the accompanying drawings, Figure 1 represents an elevation and partial axial section of one form of the invention, Fig. 2 shows an enlarged fragmentary portion of Fig. 1, Fig. 3 is a top view of Fig. 2 with some of the elements omitted, Fig. 4 shows a section of Fig. 3 on the line 4, 4, Fig. 5 represents an elevation and partial vertical axial section of a modification of the invention, Fig. 6 shows an elevation and partial axial section of a second modification of the invention, Fig. 7 shows an elevation of a third modification of the invention, Fig. 8 represents a modification of Fig. 7 and Figs. 9 and 10 show elevations of further modifications of the invention.

Referring particularly to Figs. 1 to 4, a motor box is shown at 20 having the base frame 21, the roof plate 22, the side wall 23 carrying electric appurtenances to be described, and the side wall 25 having formed therein the large opening 26 with the door 27. The motor box in this instance contains the electric motor 30, although other styles of motors may be used. The motor 30 is belted to the spindle 31 of the turntable 32 carrying the disk record 33. A sound producing compartment with the wall 35 and crown 36 is detachably supported on the plate 22 and has formed therein a large opening 37 with the door 38. A horn with the speaker 41 is supported on the support 42 and is located over the disk record 33. Upon the crown 36 of the sound complement is detachably supported the hollow base 46 of a combined lamp stand and sound duct 47 having extending from its outer surface the flange 48. From the top of the stand 47 extend curved branch sound ducts 50. At the intersection of the ducts 50 is formed a bell end 51 with a guide slot 52, and at the ends of the said ducts 50 are formed bell ends 53 having guide slots, which latter bell ends and slots are similar

to 51 and 52. The bell end 51 carries a bell shaped globe 54, and the bell ends 53 carry similar bell shaped globes 55. The globes 54 and 55 constitute sound horns for the sound duct 47. The globes 54 and 55 may consist of any suitable material and may be of clear glass or of translucent and reverberating material.

In each of the bell shaped ends 51 and 53 there is provided a sound regulating device consisting of the disk 60 shouldered at 61 and having perforations 62, guideway 64 and axial opening 65. The disk 60 is held in place in its bell end by means of the knees 66. A rotatable disk 67 with perforations 68 and hollow hub 69 is located upon the disk 60, being guided by the shoulder 61. The perforations 68 are of equal area with the perforations 62. Adjusting clips 70 have heels 71, that bear on the outer circumferential portion of the disk 60, and their other ends bear on the disk 67. Adjusting screws 72 are in threaded engagement with the disk 60 and enable the clips 70 to bear with requisite pressure upon the disk 67, to produce sufficient frictional resistance between the two disks to hold the disk 67 in proper position, when variable sound ports are formed with the perforations 62 and 68. A regulating handle 73 with the knob 74 extends from the disk 67, bears on the guideway 64 and extends through the guide slot 52. A conduit 75 is fastened to the hub 69 and supports the electric lamp 76. The axial center of the lamp 76 coincides with the axial center of the globe fastened to its accompanying bell end. Sufficient room is left between the outer surface of the lamp and the inner surface of its globe to permit the easy transmission of sound waves from the ducts of the apparatus. A lamp shade 80 preferably of translucent reverberating material with a parabolic crown 81 is carried on a supporting ring 82, which latter is carried by rods 83 extending from a ring 84, the latter being preferably made in two halves, so that it can be clamped in place on the upper portion of the duct 47 and supported on the flange 48 of the latter. A pair of mainline wires 90, 91 for electric current extend to the plug 92 supported in the wall 23 of the motor box 20. A wire 93 extends from the plug 92 to a binding post 96 on the electric motor 30, and a wire 95 extends from a second binding post 94 on the motor to a controlling switch 97 in the said wall 23. The wire 93 has extending therefrom the wire 98 and a wire 99 leading from the plug 92 is connected with a second controlling switch 100. A wire 102 connects the switch 97 with the plug 92 and a wire 103 connects said plug and switch 100. The wires 98 and 99 are wound together into a coil 105. The coil 105 extends through the conduit 47 of the lamp and the central bell

shaped end 51, and branch coils 106, 107 extend through the ducts 50 to conduct the requisite electric energy to the lamps 76 of the bell ends.

The operation of the invention is evident from the description of the parts and it will suffice to say that by means of the controlling switch 97, the motor 30 can be either started or stopped, thereby controlling the rotations of the turn-table 32 and the production of sound from the disk record 33, with the coöperation of the speaker 41 and horn 40. The controlling switch 100 enables the operator to energize the lamps 76 and shut off the current therefrom. The sound apparatus and the lamps may be either made to perform their functions separately or simultaneously. When the sound waves leave the horn 40 they travel up the duct 47 and pass through the globes 54, 55 which latter constitute secondary horns. After the sound waves leave the globe 54 they strike the parabolic crown 81 of the lamp shade 80, reverberate the latter and are deflected therefrom. If the lamps 76 are energized, when the sound waves reach the globes 54 and 55 they are distributed by the heat radiating from said lamps.

In Fig. 5 the motor box 20 with its appurtenances, and the sound producing compartment with the wall 35 and crown 36 are similar to those already described. The stand in this instance indicated by the numeral 110 is ornamented and hollow and also constitutes a main sound duct. From the upper end of the duct 110 extend, in this instance, three curved branch sound ducts 114, which each have formed therewith bell ends 115, that contain the disks 60 and 67, the lamps 76 and their appurtenances as already described. The bell ends 115 have formed therewith the combined lamp globes and sound horns 116 preferably of translucent and reverberating material and that have extending therefrom the pins or projections 117. A lamp shade 120 preferably of translucent and reverberating material is formed with openings 121 extending up from the lower edge 122 thereof. The shade bears upon the horns 116, the openings 121 registering therewith, and the pins 117 enter small openings formed in the lamp shade 120.

In Fig. 6 is represented the motor box 20 with its appurtenances and the sound producing compartment with the wall 35 and crown 36. Both the motor box and sound producing compartment are similar to those already described. A lamp stand 125 is fastened to the crown 36 and has fastened in the axial center thereof the main sound duct 126. A pipe fitting 127 with the horizontal pipe 128 is fastened to the sound duct 126, and the pipe 128 has flexibly jointed thereto the arm 129 with the speaker 41. The latter

coacts with the disk record 33 as shown. From the upper end of the main sound duct 126 extend the flexible branch sound ducts 130, that gradually increase in diameter from their inner to their outer ends. The ducts 130 have each connected thereto the bell end 131, which is similar and contains appurtenances similar to the bell ends 51 and 53 already described. To the bell ends 131 are attached the combined drooping lily lamp shades and sound horns 132 that contain lamps similar to 76, and which are controlled by the chains 133. To energize the lamps the coil 105 enters the sound duct 126 and extends to the lamps of the apparatus. The lamp shades 132 are preferably made of translucent material that will reverberate with sound waves.

In Fig. 7 the motor box 20, and a sound producing compartment having the wall 35 and crown 36, with their contents are preferably similar to the form shown in Fig. 6. The stand in this instance is indicated at 140 being appropriately ornamented. The stand contains a sound duct similar to 126, which latter has extending therefrom the elbow 141 to which is attached the hollow goose neck 142, the latter increasing in diameter from its lower to its upper end. A bell end 143 is attached to the upper end of the goose neck and is similar and has appurtenances similar to the bell ends 131. A globe 144 is provided with a lamp having the bulb 145 and which in addition to its function as a distributor of light performs the function of a sound horn. By reason of the form of the globe 144 and form of the bulb 145, there is produced an annular space between the bulb and globe which, in a plane taken through the longitudinal axis of said elements resembles the form of a sound horn as indicated at 146.

In Fig. 8 the motor box 20, and a sound producing compartment having the wall 35 and crown 36, with their appurtenances are preferably similar to those shown in Fig. 6. The lamp stand is indicated at 150, which is capped by a hollow ball and socket joint 151. The stand preferably contains a sound duct similar to 126, which leads to the hollow ball and socket joint. An elbow 152 extends from the ball and socket joint 151 and connects with the hollow goose neck 153. A bell end 154 is attached to the upper end of the goose neck and is similar and has appurtenances similar to the bell end 131. A globe and sound horn 155 is provided for a lamp contained therein, which also performs the function of a sound horn. By means of the bell and socket joint the globe and sound horn 155 can be placed in any angular position to direct the sound and light waves in any direction. In Fig. 9 the motor box 20, with a sound producing compartment having the wall 35 and crown 36 with their

contents are preferably similar to the form shown in Fig. 6. The lamp stand which constitutes the sound duct is indicated at 160. A bell end 161 with appurtenances similar to those of the bell end 53 and its appurtenances is formed at the top end of the stand 160. A sound horn 162 extends from the bell end 161. A plurality of inverted lamps 163 are supported on the ends of the goose necks 164, that extend from the top end of the stand 160 and which may be flexible. A lamp shade 165 of translucent reverberating material and preferably parabolic at its crown is supported on the ring 166, and the latter is carried on the rods 167 extending from the ring 168, detachably connected to the stand 160.

In Fig. 10 the motor box 20, with a sound producing compartment having the wall 35 and crown 36 with their contents, are preferably similar to the form shown in Fig. 6. The lamp stand which constitutes the sound duct is indicated at 170. A bell end 171 with appurtenances similar to the bell end 53 and its appurtenances is formed at the top end of the stand 170. A sound horn 172 extends from the bell end 171. A lamp 173 is supported in the axial center of the sound horn being stepped from it in a manner similar to that shown in Fig. 2, so as not to obstruct the sound waves. A lamp shade 175 preferably of translucent material and parabolic at its crown is supported on the ring 176 and the latter is carried on the rods 177, extending from the ring 178 that is detachably connected to the stand 170. The lamp shade 175 is also preferably made of reverberating material.

Having described my invention what I desire to secure by Letters Patent and claim is:

1. In an apparatus of the character described, the combination of a sound producing device, a sound duct for the device and an exposed lamp at the outer end of said duct adapted by means of the heat radiation to deflect the sound produced.

2. In an apparatus of the character described the combination of a sound producing device, a main sound duct for the device, branch ducts extending from the main duct, a lamp at the outer end of each branch duct to deflect the sound produced and a shade over the lamps.

3. In an apparatus of the character described the combination of a sound producing device, sound ducts coacting with said device, sound regulating means connected to each duct, a lamp at the outer end of each duct, a globe for each lamp constituting a sound horn and a shade having a parabolic surface over the globes constituting a secondary sound horn.

4. In an apparatus of the character described the combination of a sound producing device, a main sound duct for the

device, branch ducts extending from the main duct, a lamp at the outer end of each branch duct and a shade over the lamps.

5 5. In an apparatus of the character described the combination of a sound producing device, a sound duct for the device, a bell at the upper end of the sound duct and coaxial therewith, a globe for the bell end, a lamp in the axial center of the globe
10 and a lamp shade over the globe performing the functions of a sound horn.

6. In an apparatus of the character described the combination of a sound producing device, a main sound duct for the
15 device, a bell end at the upper end of the sound duct and coaxial therewith, a globe for the bell end, a lamp for the globe, a plurality of branch sound ducts extending from the main sound duct, a bell end for
20 each of the branch ducts, a globe for each of the latter bell ends, a lamp for each of the latter globes and a shade over all the globes to reverberate with the sound waves produced and perform the functions of a
25 sound horn.

7. In an apparatus of the character described the combination of a sound producing device, a main sound duct for the device, a bell end at the upper end of the

main duct, a globe for the bell end, a lamp
30 for the globe, a plurality of branch sound ducts extending from the main sound duct, globes for the branch ducts, a lamp for each of the latter globes, a sound controlling device for the bell end, and for each of the
35 branch ducts and a lamp shade to reverberate with the sound produced, located over all the globes.

8. In an apparatus of the character described the combination of a sound producing device, a sound duct extending from
40 the device, a bell end having a guide slot at the outlet end of the duct, a stationary disk having perforations in the bell end, a rotatable disk having perforations registering with the stationary disk, a regulating
45 handle for the rotatable disk extending through the guide slot of the bell end and adjusting clips with one end of each bearing on the stationary disk and the other end
50 bearing on the rotatable disk.

Signed at the borough of Manhattan in the county of New York and State of New York this 14th day of July, A. D. 1913.

GEORGE E. EMERSON.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE.

#1,185,988-----J. C. English,
Patented-June 6th, 1916.
Filed-October 10th, 1911.

J. C. ENGLISH.
TALKING MACHINE.
APPLICATION FILED OCT. 10, 1911.

1,185,988.

Patented June 6, 1916.
5 SHEETS—SHEET 1.

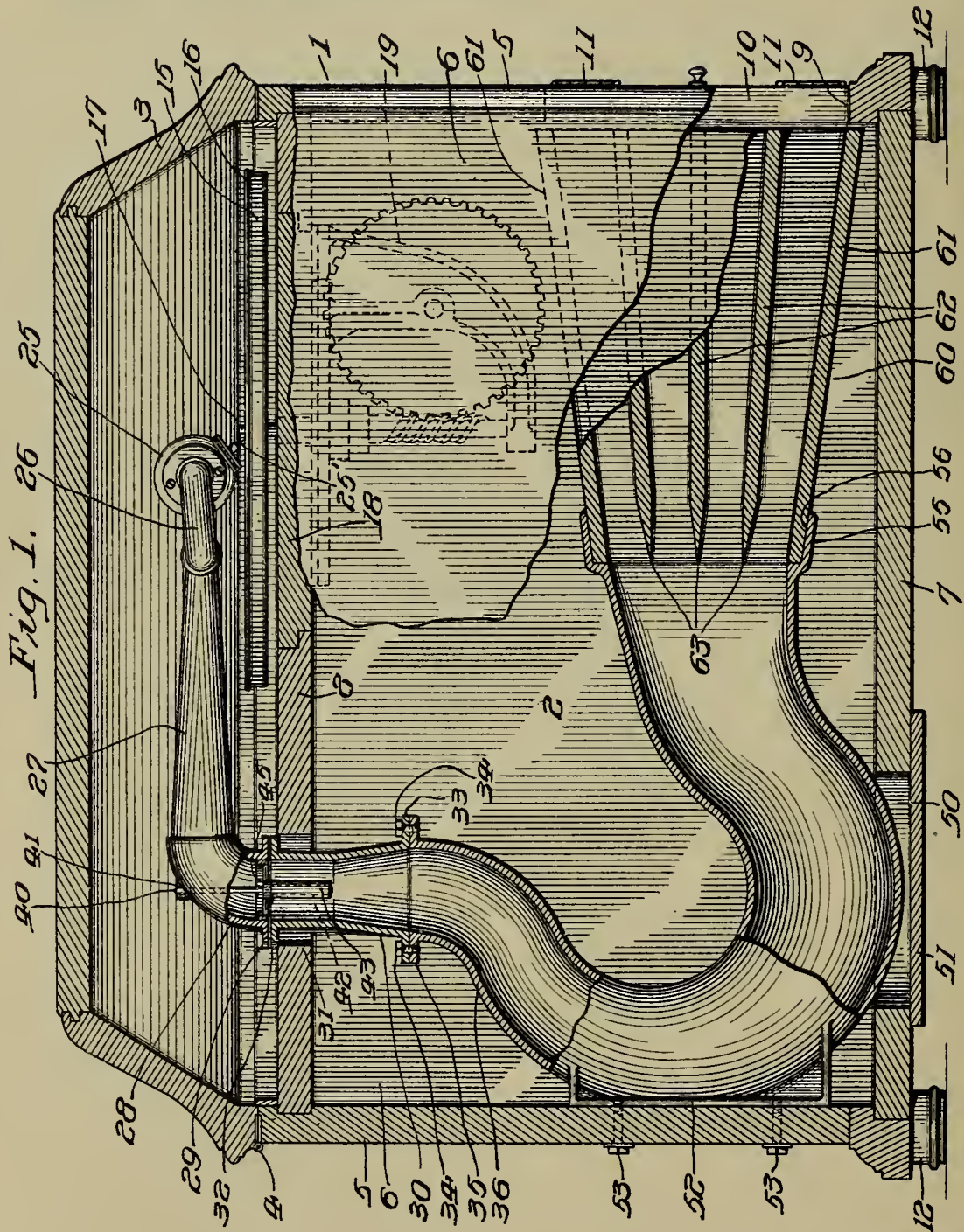


Fig. 1. 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

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5 SHEETS—SHEET 2.

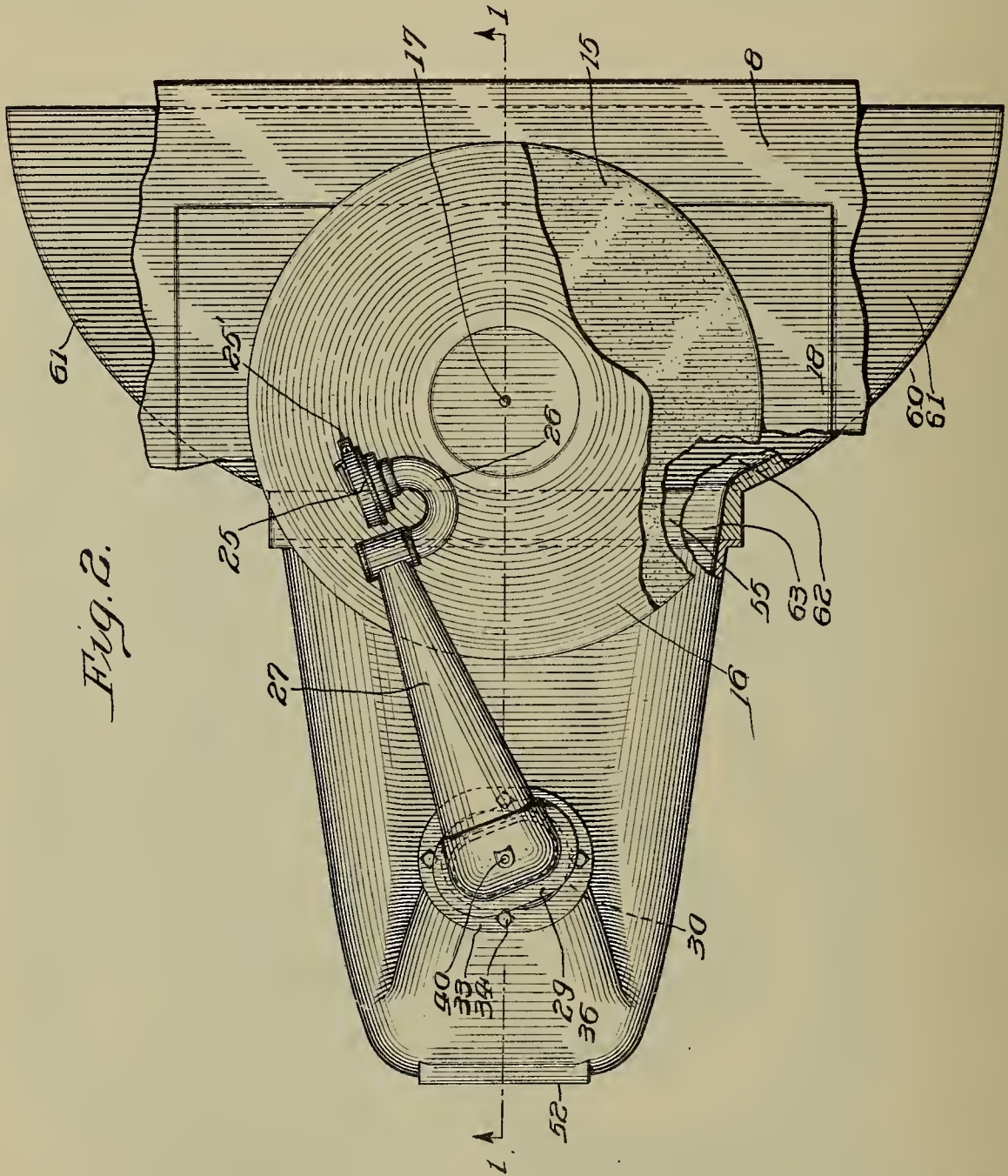


Fig. 2.

WITNESSES
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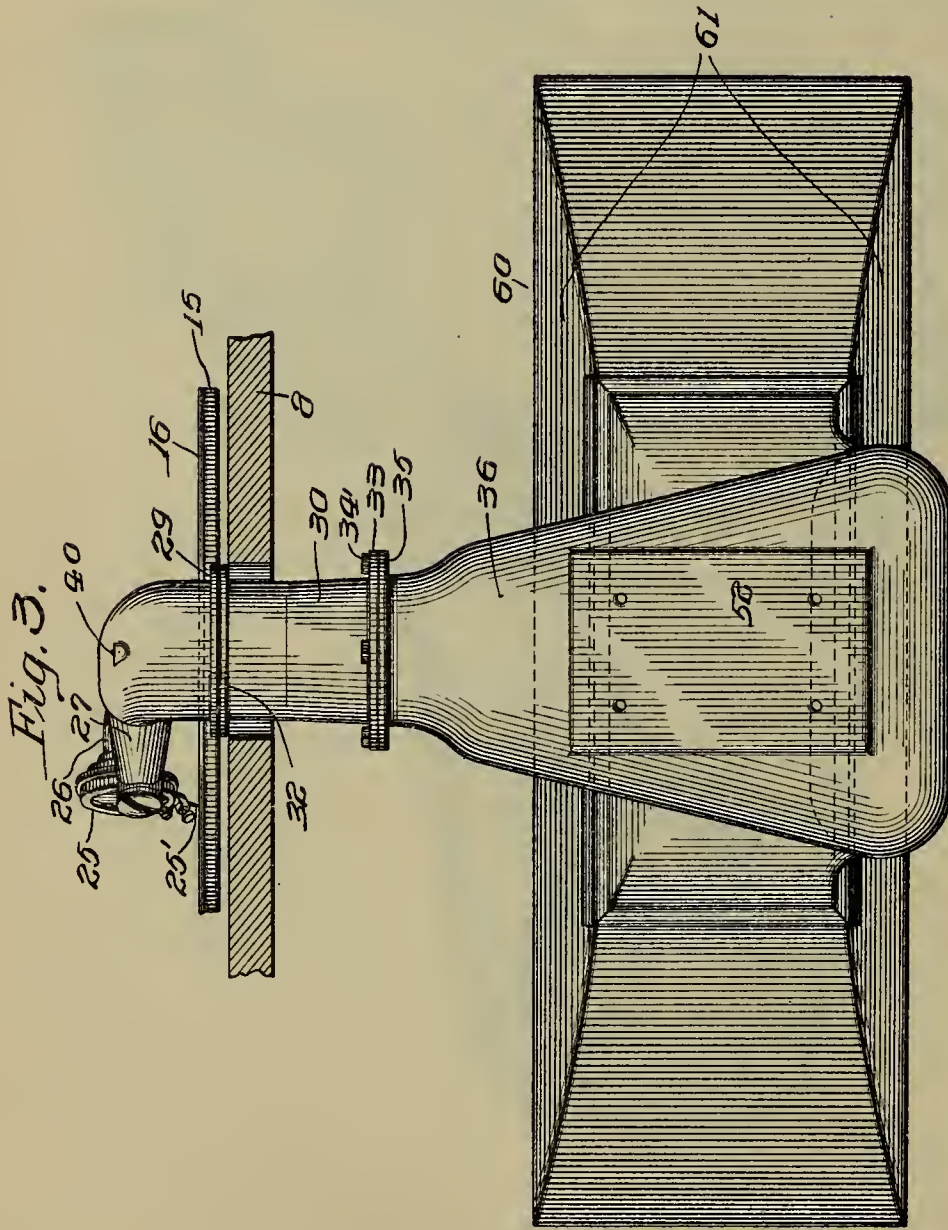


APPLICATION FILED OCT. 10, 1911.

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5 SHEETS—SHEET 3.



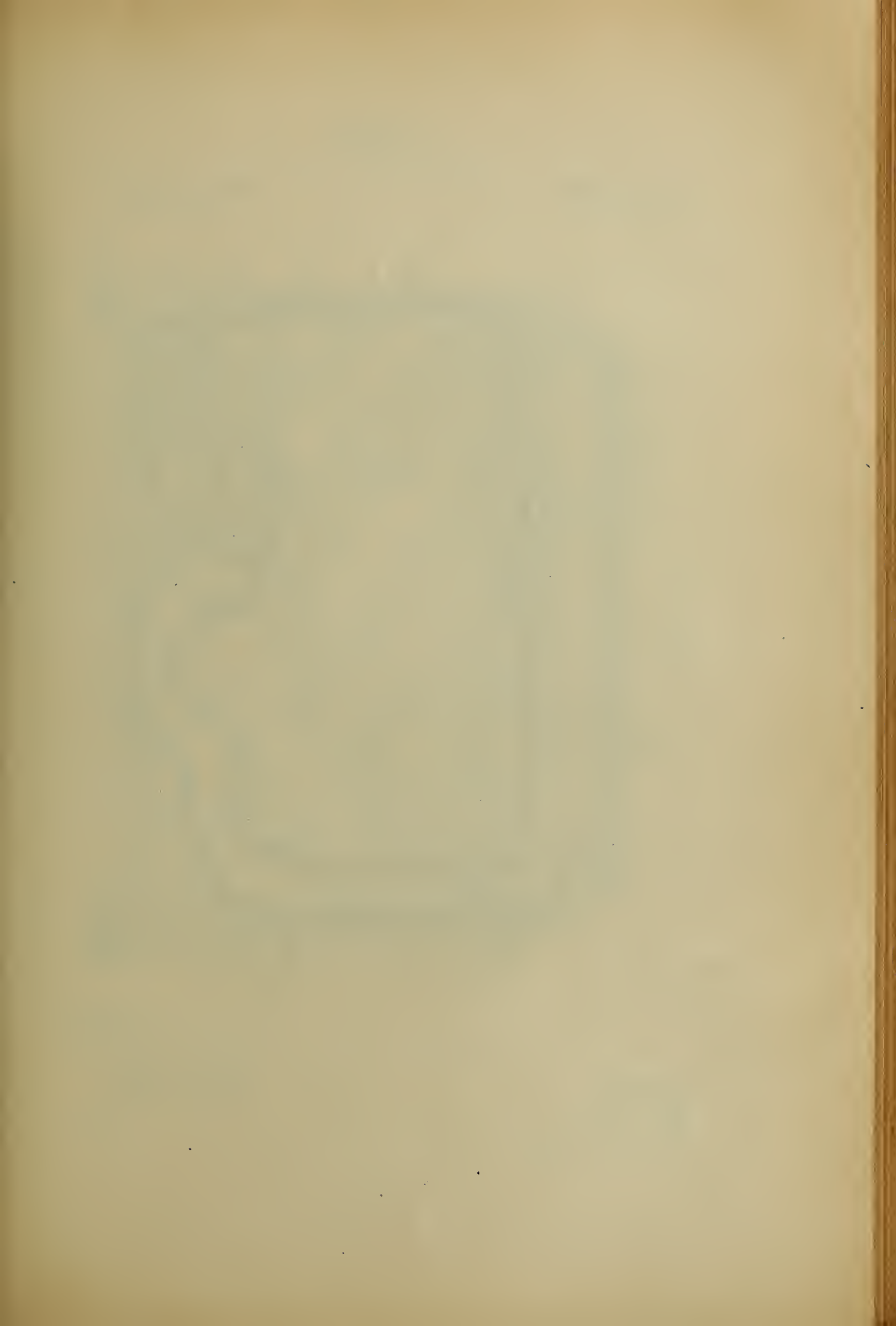
WITNESSES
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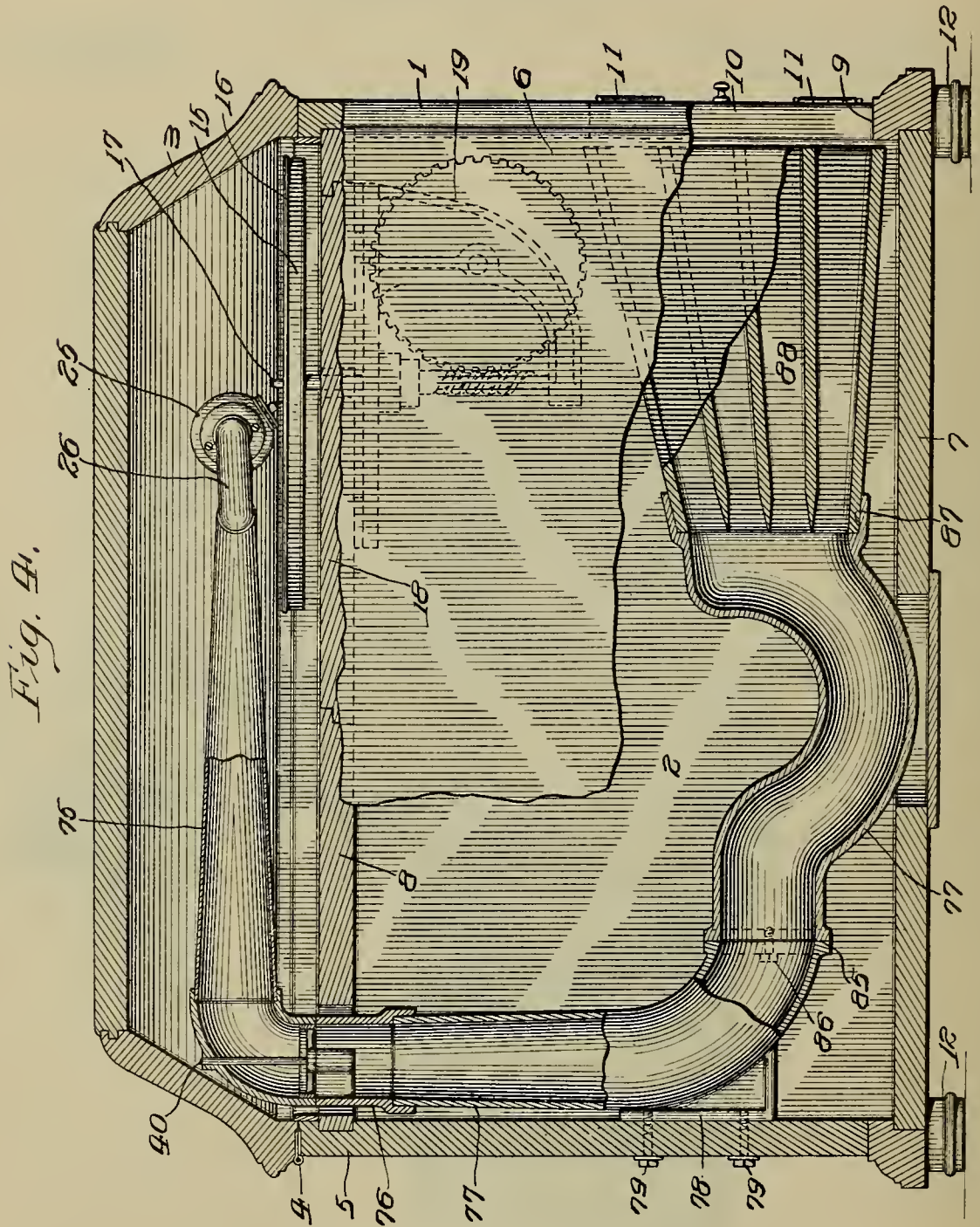
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1,185,988.

Patented June 6, 1916.
5 SHEETS—SHEET 4.



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APPLICATION FILED OCT. 10, 1911.

1,185,988.

Patented June 6, 1916.
5 SHEETS—SHEET 5.

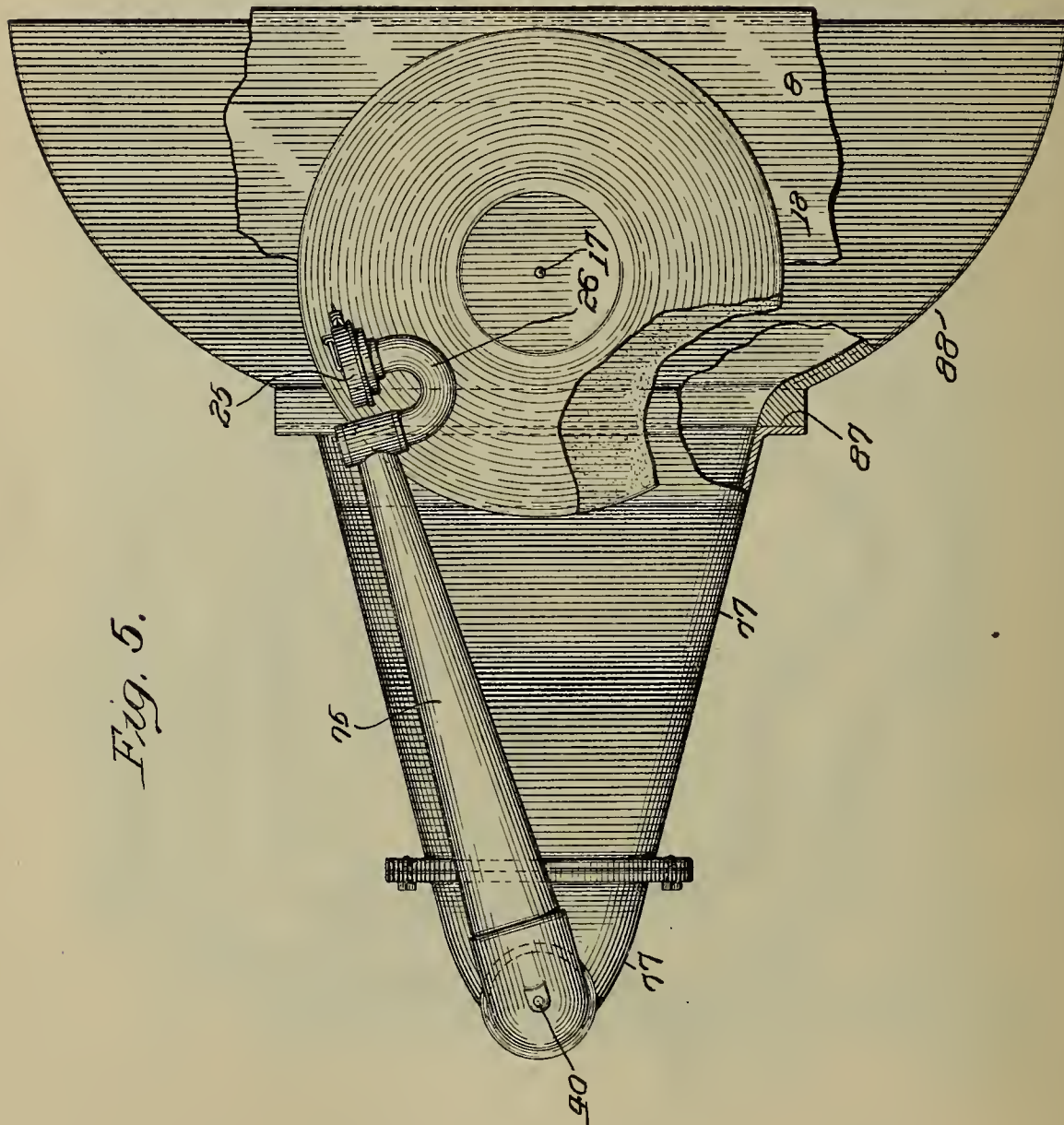


Fig. 5.

WITNESSES
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UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,185,988.

Specification of Letters Patent.

Patented June 6, 1916.

Application filed October 10, 1911. Serial No. 653,880.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

The main objects of this invention are to provide in a talking machine, an improved sound box arm and mounting therefor, and to provide improved sound amplifying means; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary vertical longitudinal section on line 1—1 of Fig. 2, of a talking machine constructed in accordance with this invention; Fig. 2 is a fragmentary top plan view of the same; Fig. 3 a fragmentary rear end elevation of the same; Fig. 4 a fragmentary vertical longitudinal section of a modified form of this invention, and Fig. 5 a fragmentary plan view partly in horizontal section of the same.

Referring to the drawings, particularly to Figs. 1, 2 and 3, one embodiment of this invention comprises a cabinet or casing 1, preferably rectangular in planular outline and including a main or body portion 2, and a hollow movable cover 3 superimposed thereon and hinged thereto as at 4.

The body of the cabinet 2 comprises the usual comparatively rigid exterior vertical front and rear walls 5, and side walls 6, and a horizontal bottom wall 7 rigidly connecting the lower edges of the vertical walls. A comparatively thick and rigid horizontal partition 8 extends across the upper portion of the body 1 and is rigidly secured to the vertical walls thereof. The lower portion of the front vertical wall 5 of the cabinet is provided with the usual rectangular opening 9 closed by one or more doors 10 hinged to the front wall as at 11 to open outwardly. The body 2 is preferably mounted upon the usual short standards 12.

Within the cabinet and over the front portion of the horizontal partition 8 is arranged a horizontal turntable 15 adapted to support a sound record 16. This turntable 15 is mounted as usual upon the upper end of a vertical rotary spindle 17, which extends downwardly through the usual upwardly removable section 18 of the horizontal partition 8, and is driven by suitable

actuating mechanism 19 depending within the cabinet from this section.

Within the cabinet and above the turntable 15 is arranged the usual or any suitable sound box or sound reproducer 25, including a stylus 25' adapted to cooperate with the record 16. The sound box 25 is preferably secured to and carried by one end of a U-shaped metal tube 26, and the other end of which is pivotally connected to the free smaller end of the longitudinally tapering hollow metal sound box arm or tone arm 27, the sound box communicating with the tone arm through the U-shaped tube 26. The U-shaped tube 26 is preferably substantially round in cross-section throughout its length, and the adjacent free end of the tone arm 27 is also preferably round in cross section. From its free smaller end, the tone arm 27 preferably extends for the greater part of its length in a substantially horizontal direction rearwardly and then curves downwardly longitudinally in an arc of 90° and terminates in a substantially vertical transversely oblong or oval open end 28, preferably surrounded flush therewith, by an outwardly projecting oblong or oval flat horizontal flange 29.

The tone arm is preferably circular in transverse section externally and internally only at its smaller end, and is preferably oblong or oval in transverse section externally and internally throughout the rest of its length, all transverse oblong sections of the tone arm having their major axes parallel and substantially horizontal, and the major and minor axes of the oblong transverse sections of the tone arm gradually increasing in length from the smaller to the larger end of the tone arm.

For supporting the tone arm 27 and for receiving and amplifying sound waves delivered from the larger end thereof, there is provided a rigid hollow vertical support 30, preferably made of cast iron or other suitable material and oblong in transverse section exteriorly and interiorly throughout its length. This support 30 projects freely through an aperture 31 provided therefor in the horizontal partition 8 of the cabinet. The upper end of the support 30 is surrounded by an oval horizontal flange 32 preferably integral therewith, which corresponds in shape and dimensions with the

flange 29 surrounding the larger end of the tone arm, and the lower surface of the latter flange, 29, is positioned preferably slightly above the upper surface of the flange 32 of the support when in operative position. For holding the support 30 rigidly in a fixed position, the lower end of the support 30 is surrounded by an oval horizontal flange 33 integral therewith, which registers with, rests upon, and is rigidly secured by means of bolts 34 to an oval horizontal flange 35 which surrounds and is integral with the upper end of a downwardly extending fixed hollow bracket 36.

The tone arm 27 is restrained to oscillate about a fixed vertical axis coincident with the longitudinal axis of the hollow support 30 by means of a vertical pivot 40 coaxial with the support 30, the upper end of the pivot extending snugly but rotatively through a vertical cylindrical aperture 41 provided therefor through a thickened portion of the wall of the tone arm 27, and the lower end of the pivot being rigidly secured in an aperture 42 provided therefor in a lug 43 projecting rigidly inwardly from the wall of the support 30 and preferably integral therewith. Rigidly secured in the open end of the tone arm is a spider 45 through which the pivot 40 fits snugly but rotatively. The marginal portion of the spider is preferably flush with the open end of the tone arm, and the central portion of the spider is extended downwardly slightly below the end of the tone arm and rests rotatively upon the upper end of the lug 43. Instead of the pivot 40 and cooperating parts, any other well known or suitable means may be substituted for restraining the tone arm 27 to oscillate about a fixed vertical axis.

The support 30 preferably increases externally and internally gradually in transverse sectional area throughout at least a portion of its length and the major transverse axis of the lower end of the support is preferably perpendicular to the longitudinal central vertical plane of the cabinet, giving the support, externally and internally, longitudinally, approximately a helical form.

The hollow bracket 36 is preferably made of cast iron or other similar material and has substantially rigid and non-vibratory walls. Preferably, the hollow bracket 36 is constructed and arranged so that its longitudinal axis extends from the lower end of the support 30, downwardly in a substantially vertical plane, curving gradually rearwardly from the support 30 and then gradually reversing its direction and curving downwardly and forwardly, then upwardly and forwardly forming a loop, and finally terminating in a substantially horizontal direction. The bracket 36 is preferably oval or oblong internally in transverse section

throughout its length, gradually increasing in major and minor transverse sectional axes from its upper end in contact with the lower end of the support 30 to its lower or delivery end, all transverse major axes of the interior of the bracket being preferably horizontal and parallel.

The form and arrangement of the bracket are preferably such that the rear curved external surface of the bracket is substantially tangent to the inner surface of the rear vertical wall of the cabinet so that the lowermost exterior surface of the bracket projects freely into an aperture 50 provided therefor through the bottom wall 7 of the cabinet, the lower end of the aperture 50 being covered by a closure 51 secured to the under-surface of the bottom 7, the bracket being free from the closure.

The bracket 36 is held in fixed position by means of a vertical base plate 52 integral with or rigidly secured to the rear wall of the bracket and engaging against and rigidly clamped against the inner surface of the rear vertical wall of the cabinet by means of bolts 53 or other suitable fastening devices.

The upper and lower edges of the larger or delivery end of the hollow bracket 36 are provided with outwardly projecting flanges 55, preferably integral therewith and forming a transversely rectangular oblong socket 56 which preferably flares or diverges forwardly about a longitudinal horizontal axis, the major transverse axis of the socket being preferably substantially horizontal and its minor axis being preferably substantially vertical.

For amplifying the sound waves delivered from the larger end of the hollow bracket 36, there is provided a hollow vibratory resonator 60, which tapers longitudinally and the smaller end of which is rigidly secured in the socket 56. The resonator 60 is preferably arranged with its longitudinal axis extending in a horizontal direction and is preferably rectangular and oblong in transverse section throughout its length, having its major transverse axes extending in a horizontal plane. The top and bottom exterior walls of this resonator are formed by two flat forwardly diverging substantially semi-circular sounding-boards 61 and the curved edges of these boards are connected by longitudinally curved boards 62 forming the external vertical walls of the resonator. The interior of the resonator is divided into a plurality of sound passages by means of a plurality of sounding-boards 62 which are preferably arranged in planes diverging forwardly from a common horizontal axis, and the inner ends of which are preferably sharpened as at 63. The resonator 60 is entirely supported by the hollow brackets 36 and the delivery end of the reso-

nator is preferably arranged in closed proximity to but spaced from the front wall of the cabinet, and is proportioned and located to register with the opening 9 in the front wall of the cabinet.

In the construction hereinbefore defined, there is preferably a gradual increase in the transverse sectional area of the sound passage from the sound box through the tone arm 27, the support 30, the hollow bracket 36 and the resonator 60, or from the smaller end of the tone arm to the delivery end of the resonator and there is a gradual change in cross-sectional shape of the passage from the circular shape of the smaller end of the tone arm to the oblong shape of the delivery end of the resonator. By this construction, the sound waves delivered from the reproducer 25 are gradually amplified and brought into position to be acted upon with the greatest efficiency by the resonator 60 from which the sound waves are delivered through the outlet or opening 9 in the front wall of the cabinet.

It is considered at this time that the oblong transverse shape of the sound passage through the tone arm and from the tone arm to the delivery end of the resonator, increases the efficiency of the machine over what would be obtained were the sound passage circular in transverse section from the reproducer 25 to the resonator 60, and it is also thought that the longitudinal curvature of the outer bracket 36, in which the longitudinal axis is in the form of a curve including two reversals in its curvature and in which the intermediate part of the hollow bracket is longitudinally substantially in the form of a return-bend, results in a greater efficiency than would be obtained were the reversals in the longitudinal curvature of the bracket and the return-bend in the bracket omitted. However, as the theory of the operation of this device and the reasons for the greater efficiency obtained by this device may not be fully understood at this time, applicant reserves the privilege of supplementing this specification, if found desirable, by further statements in regard to the theory of its operation when the operation of the device is more fully understood.

In the modified form of this invention, shown in Figs. 4 and 5, the construction and operation are broadly substantially the same as hereinbefore described, but the modified tone arm 75 is relatively longer than the one first described and is circular in transverse section throughout its length and terminates at its larger end in close proximity to the rear wall of the cabinet. This modified tone arm 75 is rotatably mounted at its larger end on a rigid hollow vertical support 76, also circular in transverse section throughout its length, the tone arm being connected to the support by means of a pivot

40 as hereinbefore described. The lower end of the support 76 telescopes tightly over the upper end of a downwardly extending hollow comparatively rigid metal bracket 77, which is provided with a base plate 78, integral therewith and rigidly secured to the rear wall of the cabinet by bolts 79. The hollow bracket, for convenience of construction, may be divided longitudinally as at 85 into two parts, which are fastened rigidly together by bolts 86 to form a continuous sound passage. In this instance the hollow bracket is circular in transverse section at its upper end and increases gradually in transverse sectional area throughout its length, gradually changing in transverse section from the circular shape of its upper end to a substantially oval shape and finally terminating at its larger end in a transversely oblong socket 87 in which is supported the smaller end of a resonator 88, substantially identical in construction and arrangement with the resonator 60 hereinbefore described. Longitudinally the hollow bracket 77 extends vertically downwardly from its upper or smaller end and then curves forwardly through an arc of about 90°, then reverses the direction of its curvature and curves downwardly and forwardly, then upwardly and forwardly, forming a loop or return-bend, and finally again reversing the direction of its curvature and terminating substantially horizontally as hereinbefore described in the socket 87. In this modified form, the tone arm 75, its support 76, the hollow bracket 77 and the resonator 88 are preferably entirely supported by the base plate 78 of the hollow bracket, as in the form first described.

Although only two forms in which the curvature may be embodied have been illustrated herein, it is not intended to limit the invention to any specific construction as it might be applied in various forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus fully described this invention, I claim and desire to protect by Letters Patent of the United States:

1. In a talking machine, the combination with a stationary rigid non-vibratory bracket provided with a sound conducting passage extending therethrough, of a sound conducting arm communicating with one end of said passage, and vibratory sound amplifying means communicating with the other end of said passage, said passage through said arm, bracket and amplifier being oblong in transverse section throughout their entire length.

2. In a talking machine, the combination with a stationary non-vibratory bracket provided with a sound conducting passage extending therethrough, of a swinging arm mounted on one end of said bracket and

communicating with one end of said passage, and vibratory sound amplifying means, including a substantially flat sounding board, mounted on and communicating with the other end of the passage, said passages through said swinging arm, bracket and amplifier being oblong in transverse section and having its transverse major axis considerably greater than its transverse minor axis throughout the entire length.

3. In a talking machine, the combination with a stationary bracket provided with a sound conducting passage extending there-through and having two freely projecting open ends forming an inlet and an outlet respectively for said passage, said inlet and said outlet each being oblong in outline and having a major axis considerably greater than its minor axis, a hollow sound box arm entirely supported by said inlet end of said bracket and arranged to swing with respect

thereto on an axis substantially coincident with the axis of the passage in said bracket at the end at which said arm is mounted thereon and having an oblong outlet arranged to substantially register with said inlet, sound reproducing means carried by and communicating with said arm, and hollow vibratory sound amplifying means including a sounding board entirely supported by the outlet end of said bracket and communicating therewith, said amplifying means being oblong in transverse section and having its major transverse axis considerably greater than its minor transverse axis.

In witness whereof, I have hereunto set my hand this 19th day of September, A. D., 1911.

JOHN C. ENGLISH.

Witnesses:

FRANK B. MIDDLETON,
CHARLES F. WILLARD.

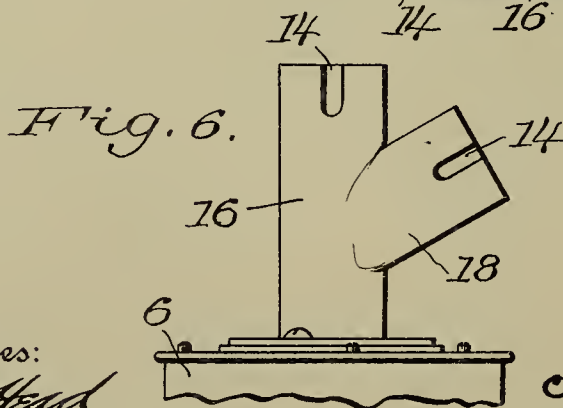
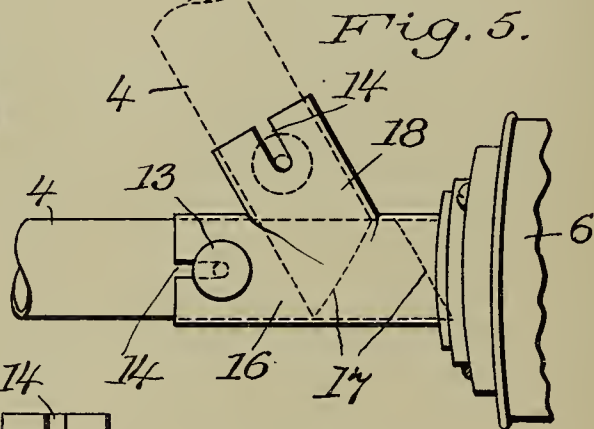
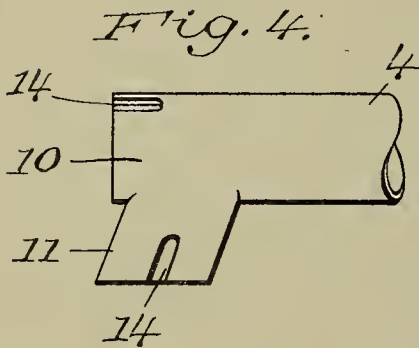
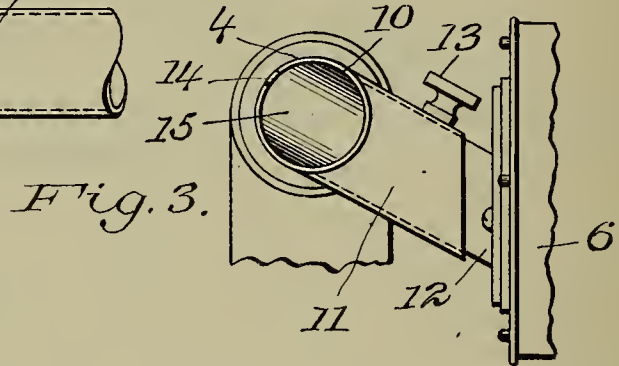
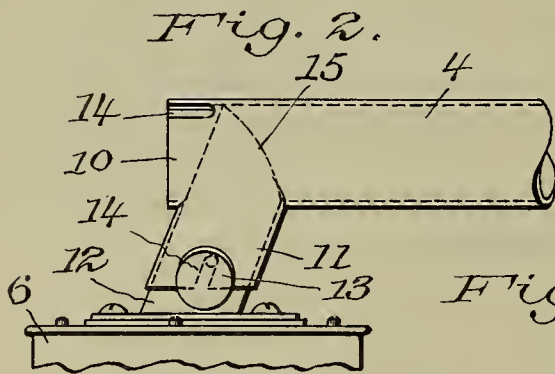
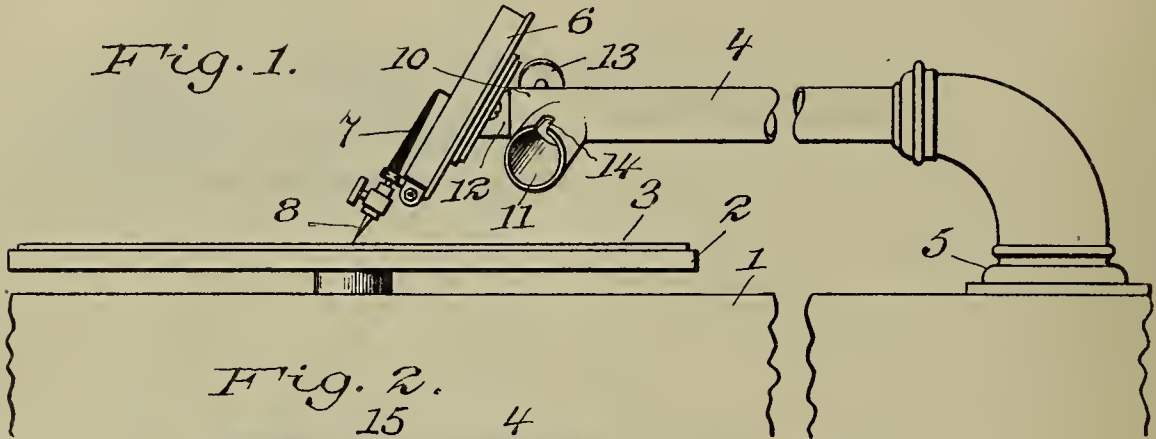
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE,
#1,186,190-----C. L. Hibbard,
Patented-June 6th, 1916.
Filed--December 19th, 1914.

C. L. HIBBARD.
TALKING MACHINE.
APPLICATION FILED DEC. 19, 1914.

1,186,190.

Patented June 6, 1916.



Witnesses:
James W. Head
Wm. J. Steel

Inventor
Charles L. Hibbard
By his attorney
Walter H. Humphrey

UNITED STATES PATENT OFFICE.

CHARLES L. HIBBARD, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF
TO FREDERIC W. HAGER, OF PHILADELPHIA, PENNSYLVANIA.

TALKING-MACHINE.

1,186,190.

Specification of Letters Patent.

Patented June 6, 1916.

Application filed December 19, 1914. Serial No. 878,092.

To all whom it may concern:

Be it known that I, CHARLES L. HIBBARD, a citizen of the United States of America, residing at the city of Philadelphia, county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates generally to talking machines and has particular reference to a connection between the tone-arm and sound-box, by which the latter may be readily and conveniently set to coöperate with either the "zig-zag" or the "hill and dale" type of record.

The accompanying drawings will serve to illustrate several forms of a device suitable for carrying my invention into effect. I wish it understood, however, that I do not limit myself to the precise details shown, as various changes may be made therein, without departing from the spirit and scope of my invention.

In the drawings, Figure 1 is a view in elevation showing the preferred form of connection in use, the sound-box being arranged for reproducing from a "hill and dale" record. Fig. 2 is an enlarged detail plan view, showing the sound-box shifted for use with a "zig-zag" type of record. Fig. 3 is a front view thereof, and Fig. 4 illustrates the shaped end of the tone-arm with which the sound-box is adapted to be coupled or connected. Fig. 5 is a plan view of a modification, in which the sound-box is shown in position to coöperate with a "hill and dale" record, and Fig. 6, is a similar plan view, showing the sound-box as it would be arranged to reproduce from a "zig-zag" type of record.

Referring now to the drawings, 1, represents a portion of the casing of a talking machine, 2, the turn-table carrying the record 3, 4, the tone-arm mounted at 5, in the usual manner to have movement in vertical and horizontal planes, and 6, the sound-box provided with a lever at 7, terminating in a needle or stylus 8, arranged to track in the groove of the record.

In order to adapt the sound-box to coöperate with the two well known commercial types of disk record, one, the lateral cut, known as the "zig-zag" record and the other, the up and down cut, known as the "hill and dale" record, it is necessary to place the

sound-box in such relation to the record, that the stylus lever may respond fully to the undulations of the sound groove and the sound-box is accordingly arranged as in Fig. 1, or in Fig. 2, the position in which it is shown in Fig. 2, adapting it for the "zig-zag" record and in Fig. 1 for the "hill and dale" type. To enable the sound-box to be thus relatively placed and quickly shifted from one position to the other, I preferably employ the coupling or connection shown in Figs. 1, 2, 3, and 4, which consists in giving the free end of the tone-arm a bifurcated form, one branch 10, being a continuation of the tone-arm proper and the other 11, an angular extension therefrom, as shown.

Formed in part with or otherwise secured to the sound-box, there is a short tube 12, which leads from the diaphragm chamber thereof and is shaped and proportioned to telescope into either of the terminal branches 10, and 11, of the tone-arm, being firmly held therein from turning by a set-screw 13, which is adapted to fit in a notch 14, formed in each of the branches.

In shifting the sound-box from one position to the other, it is desirable for many reasons, to avoid changing the length of the tone-arm and as it is necessary to close one branch of the arm when the sound-box is coupled or connected with the other, the tubular extension 12, of the sound-box is so proportioned that both results are accomplished as the coupling is effected. As shown in Fig. 1, when the sound-box is positioned to coöperate with a "hill and dale" record, the tubular extension thereof telescopes into the branch 10 of the tone-arm to a depth sufficient to close the opening through the other branch 11, and is then positively checked by the set-screw 13, of the extension tube 12, entering the notch 14, of the branch tube of the tone-arm.

When the sound-box is shifted, by being coupled with the angularly disposed branch 11, of the tone-arm, as in Fig. 2, to coöperate with the "zig-zag" type of record, the tubular extension 12, of the sound-box telescopes into the tone-arm branch 11, until it contacts with the far inner wall of the branch 10, and closes the opening through the latter, the end 15, of the extension 12, being shaped, as shown, to clear the sound passage through the tone-arm proper. In

this adjustment of the sound-box, the set-screw, entering the notch in the tone-arm branch does not function as a stop, that being done by the end of the sound-box extension in contacting with the inner wall of the other branch tube but it serves to set the box at the proper angle and secure it against independent play or movement.

In the modification illustrated in Figs. 5 and 6, the tubular extension of the sound-box is shown bifurcated, one branch 16, when coupled in telescoping relation with the open end 17, of the tone-arm, serving to adapt and position the sound-box for use with the "hill and dale" record as shown in Fig. 5, and the branch 18, when similarly coupled, adapting it for use with the "zig-zag" type. In this, as in the other form of coupling, the branch not in use, is closed by the telescoping end of the cooperating member, as above described.

An important structural feature of the invention consists in inclining the tubular extension of the sound-box at such an angle to the body thereof as to cause the box, when connected through either branch of the coupling, to take a fixed and definite position with relation to the record, thus relieving inexperienced users from the necessity of adjusting the same.

As the method of use and operation will be apparent from the foregoing, further description thereof will not be given.

Among the important advantages of the invention may be mentioned, the extreme

simplicity, inexpensiveness and effectiveness of the device, neither skill nor experience being required in its use, the sound-box becoming definitely, accurately and properly set in either of the two positions by the mere act of coupling the parts in telescoping relation. These and other advantages give the device many points of superiority over the several forms of connection now commonly employed to accomplish the same purpose.

Having, therefore, described my invention, I claim:

1. A tubular coupling for a sound-box comprising two members, one of which terminates in angularly disposed branches each suitable for receiving the other member in telescoping relation, the last mentioned member being adapted to extend through any one of the said branches and form a direct connection beyond said branches with the body of the branched member.

2. A tubular coupling for a sound-box comprising a tone-arm terminating in two angularly disposed branches, a tubular extension, from the sound-box adapted to extend through either of the branches to a depth sufficient to close the other branch and form a direct connection beyond the same with the tone-arm proper, each of the branches being provided with means for holding the sound-box in playing position.

CHARLES L. HIBBARD.

Witnesses:

FREDERIC W. HAGER,
PALMER WATSON.

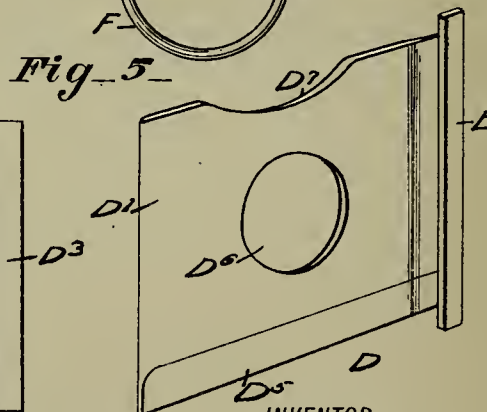
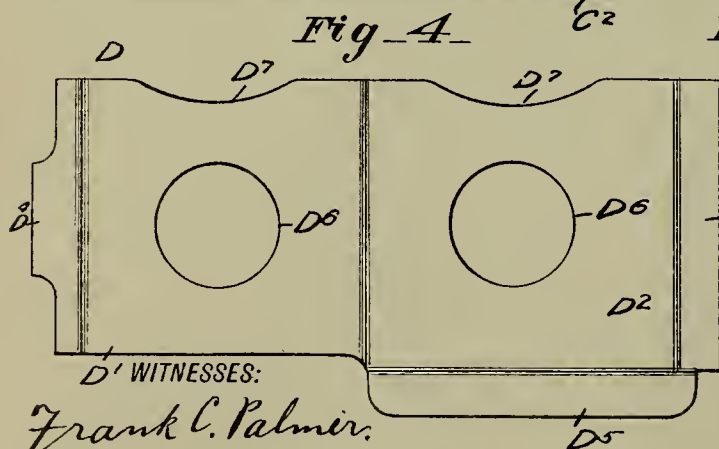
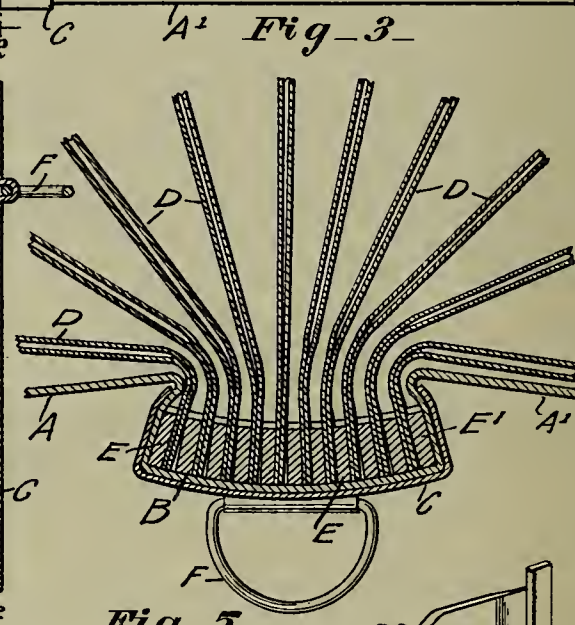
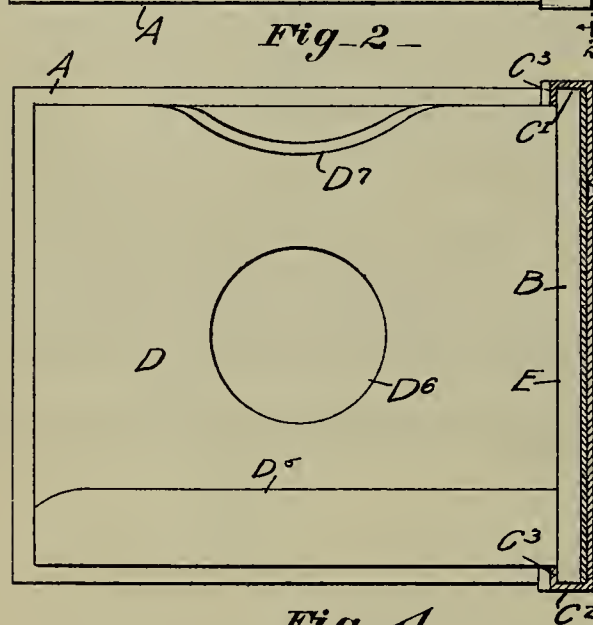
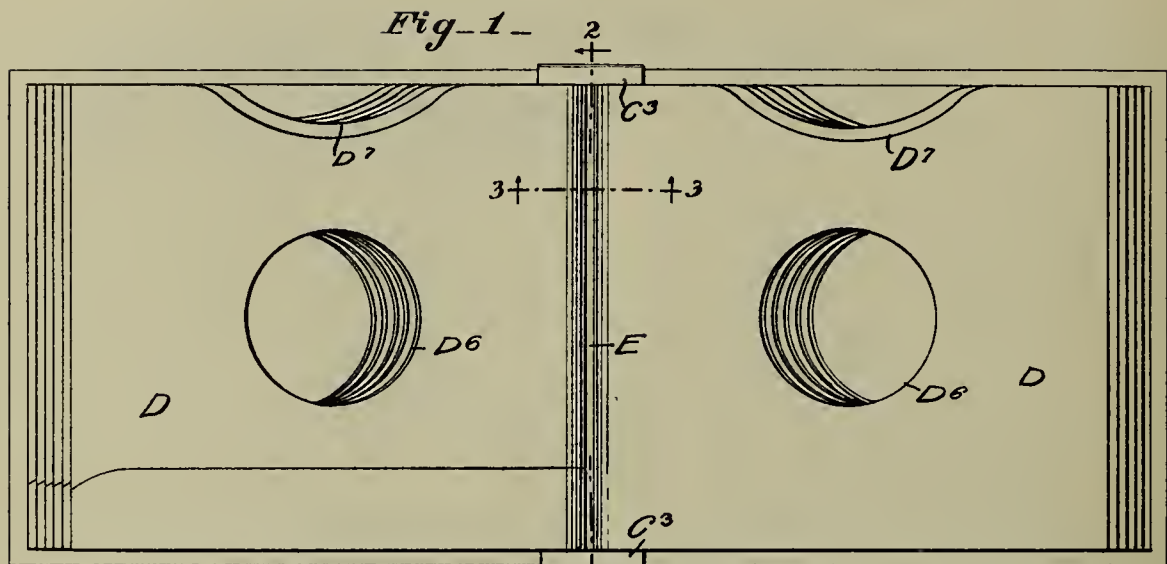
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DISK RECORD HOLDER,
#1,186,312-----C. F. Hanselmann,
Patented-June 6th, 1916.
Filed-April 15th, 1915.

C. F. HANSELMANN.
DISK RECORD HOLDER.
APPLICATION FILED APR. 15, 1915.

1,186,312.

Patented June 6, 1916.



WITNESSES:
Frank C. Palmer.
Herb. Hester.

INVENTOR
Charles F. Hanselmann.
BY *Munn*
ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES F. HANSELMANN, OF NEW YORK, N. Y., ASSIGNOR TO PHONO RECORD BOOK COMPANY, OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

DISK-RECORD HOLDER.

1,186,312.

Specification of Letters Patent.

Patented June 6, 1916.

Application filed April 15, 1915. Serial No. 21,531.

To all whom it may concern:

Be it known that I, CHARLES F. HANSELMANN, a subject of the German Emperor, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Disk-Record Holder, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved holder for phonographic disk records, which is simple and durable in construction, cheap to manufacture and arranged to allow of conveniently placing a record in position in the holder or removing it therefrom.

In order to accomplish the desired result use is made of a disk record holder in the form of a book having a back provided at the top and bottom with retaining flanges and envelopes having spacing and binding bars at their inner ends, the bars projecting beyond the top and bottom of the envelopes, and the projecting ends of the bars being engaged by the said retaining flanges to securely hold the envelopes between the covers of the book.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a face view of the disk record holder in open position; Fig. 2 is a transverse section of the same on the line 2—2 of Fig. 1; Fig. 3 is an enlarged sectional plan view of the same on the line 3—3 of Fig. 1; Fig. 4 is a face view of the blank for forming one of the envelopes; and Fig. 5 is a perspective view of one of the envelopes.

The disk record holder is in the form of a book having covers A, A' connected with each other by a back B reinforced exteriorly by a box-shaped reinforcing member C, preferably made of sheet metal or other suitable sheet material. The disk records to be stored are placed into envelopes D, each

open at the top, and each is provided at its inner end with a reinforcing spacing and binding bar E projecting beyond the top and bottom of the envelop to provide retaining members engaged by top and bottom flanges C' and C² of the reinforcing back member C. Each flange C', C² extends over the several projecting ends of the bars E and is provided with an angular terminal C³ fitting onto the edge of the corresponding projecting end of the reinforcing bars E, as will be readily understood by reference to Fig. 2. By the arrangement described the bars E are securely held in position on the back B of the holder and the envelopes are spaced apart so as to readily compensate for the thickness of the disk records placed in the envelopes.

In manufacturing the disk record holder, one of the flanges, preferably the top flange C', is straight and in alinement with the back member C to allow of conveniently placing the bars E in position on the other flange C² and against the back D, and then the flange C' is bent inward and its terminal C³ is bent downward to firmly engage the upper projecting ends of the bars E thus securely fastening the envelopes in place. Each of the envelopes is preferably made from a single sheet of paper or other suitable material doubled up to form a body having two members D', D² between which the disk record is held. The member D² is provided at its outer end with a gummed surface D³ and the outer end of the other member D' is provided with a tongue D⁴ adapted to be fastened to a portion of the gummed surface D³ on doubling up the members D' and D². The member D² is provided at the bottom with a gummed flap D⁵ folded onto the outer surface of the member D' after the latter is fastened by its tongue D⁴ to the gummed surface D³. Thus the envelop is formed with an opening at the top for the insertion or removal of the disk record. The spacing and binding bar E is extended over the tongue D⁴ and onto the remaining portion of the

gummed surface D^3 to be fastened thereto by the gum of the surface. Thus the spacing bar E overlies the tongue D^4 and securely holds the same in position on the gummed surface D^3 and at the same time the latter is used for securely fastening the bar E in position at the end of the envelop. The members D' and D^2 are provided with the usual central openings D^6 for viewing the title of the disk record, and the upper edges of the members D' and D^2 are provided with the usual cut-out portions D^7 for obtaining a convenient hold of the record disk on removing the same from the envelop.

An extra spacing bar E' is placed in position on the back B between one side of the back B and the first envelop D (see Fig. 3) to properly space this envelop from the corresponding cover.

By reference to Fig. 3, it will be noticed that the sides of the box-shaped reinforcing member C of the back B converge and firmly engage the corresponding side portions of the back B thus securely holding the reinforcing member C in position on the back.

The back member C is preferably provided with a handle F for conveniently placing the holder in position in a cabinet or removing it therefrom.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A disk record holder, comprising a back, covers, and record holding envelopes between the covers and having spacing bars at their inner ends secured to one face of the envelop and spacing the envelopes apart, the said spacing and binding bars projecting beyond the top and bottom of the envelopes and the said back having top and bottom retaining means engaging the projecting ends of the said spacing and binding bars to hold the envelopes in place.

2. A disk record holder in the form of a book having a back provided at the top and bottom with retaining flanges, and envelopes having spacing and binding bars at their inner ends secured to one face thereof, the bars projecting beyond the top and bottom of the envelopes and the projecting ends of the bars being engaged by the said retaining flanges.

3. A disk record holder in the form of a book having covers and a back, the back having a metallic reinforcing member provided at the top and bottom with inwardly extending retaining flanges having angular terminals and record holding envelopes each provided at its inner end with a spacing and binding bar secured to the face of the envelop at said end and projecting beyond

the top and bottom of the envelop, the projecting end of said bars being engaged by the top and bottom retaining flanges, the angular terminals of said flanges fitting onto the edges of the corresponding projecting ends of said spacing and binding bars.

4. A disk record holder having an envelop comprising a body formed from a single piece of sheet material doubled up in the direction of the length of the envelop to form overlying members, the free end of one of the doubled up members being fastened to the corresponding free end of the other member and the bottom of one member having a flap overlying and fastened to the bottom portion of the other member, and a reinforcing spacing and binding bar secured to the said free ends of the envelop.

5. A disk record holder having an envelop comprising a body formed from a single piece of sheet material doubled up in the direction of the length of the envelop to form overlying members, the free end of one of the doubled up members being fastened to the corresponding free end of the other member and the bottom of one member having a flap overlying and fastened to the bottom portion of the other member, and a reinforcing spacing and binding bar secured to the said free ends of the envelop, the said bar projecting beyond the top and bottom of the body of the envelop.

6. A disk record holder having an envelop comprising a body formed from a single piece of sheet material doubled up in the direction of the length of the envelop to form overlying members, the free end of one of the doubled up members having a tongue, an adhesive substance on the free end of the other member and to which the tongue of the first member is secured, the bottom of one member having a flap overlying and fastened to the bottom portion of the other member, and a reinforcing spacing and binding strip overlying the said tongue and the free end of the said gummed body member and being fastened by the adhesive substance thereof to the corresponding end.

7. A disk record holder having an envelop, comprising a body formed from a single piece of sheet material doubled up in the direction of the length of the envelop to form overlying members, the free end of one of the doubled up members having a tongue, an adhesive substance on the free end of the other member and to which the tongue of the first member is secured, the bottom of one member having a flap overlying and fastened to the bottom portion of the other member, and a reinforcing spacing and

binding strip overlying the said tongue and the free end of the said gummed body member and being fastened by the adhesive substance thereof to the corresponding end, the
5 said bar projecting beyond the top and bottom of the body of the envelop.

In testimony whereof I have signed my

name to this specification in the presence of two subscribing witnesses.

CHARLES F. HANSELMANN.

Witnesses:

THEO. G. HOSTER,

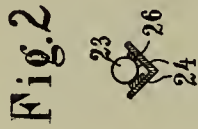
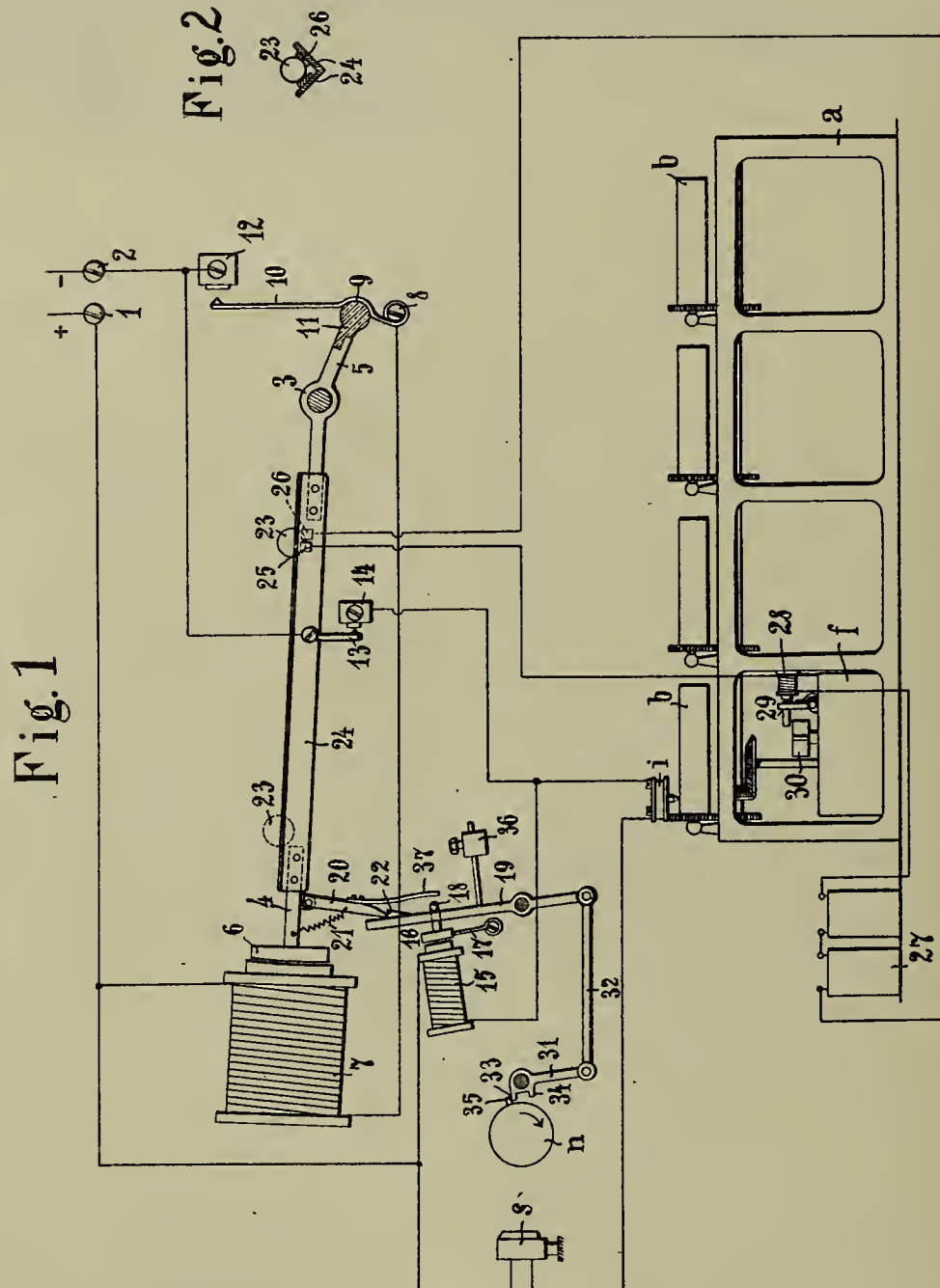
PHILIP D. ROLLHAUS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

APPARATUS FOR PHONOGRAPHICALLY RECORDING
TELEPHONICALLY TRANSMITTED CONVERSATIONS,
#1,186,450-----H. Starcke,
Patented-June 6th, 1916.
Filed-May 1st, 1912.

APPARATUS FOR PHONOGRAPHICALLY RECORDING TELEPHONICALLY TRANSMITTED CONVERSATIONS.
APPLICATION FILED MAY 1, 1912.

Patented June 6, 1916.



Witnesses:
C. H. Crawford
O. Everett Lancaster.

Inventor:
Hans Starcke
by B. Singer Atty

UNITED STATES PATENT OFFICE.

HANS STARCKE, OF COLOGNE, GERMANY, ASSIGNOR TO THE FIRM OF WALSECK & STARCKE, OF COLOGNE, GERMANY.

APPARATUS FOR PHONOGRAPHICALLY RECORDING TELEPHONICALLY-TRANSMITTED CONVERSATIONS.

1,186,450.

Specification of Letters Patent.

Patented June 6, 1916.

Application filed May 1, 1912. Serial No. 694,572.

To all whom it may concern:

Be it known that I, HANS STARCKE, subject of the King of Prussia, residing at Ubierring 52, Cologne-on-the-Rhine, Germany, have invented certain new and useful Improvements in Apparatus for Phonographically Recording Telephonically-Transmitted Conversations, of which the following is a specification.

The present invention relates to a device for phonographically recording telephonically transmitted conversations. The known apparatuses of this kind show the disadvantage that they necessitate constructional changes in the telephone apparatus and that they require the employment of a great number of auxiliary batteries or auxiliary circuits.

The device according to the present invention avoids the necessity of making constructional changes in the telephone apparatus and avoids also the employ of auxiliary batteries and circuits by working mainly with the telephonic current.

The device itself is perfectly independent of the construction of the telephone and can be connected to any telephone station by the mere interposition of a two-pole change-over switch.

The special and most important feature of my invention is to be seen in the arrangement of a multiple switch actuated by the calling current which closes several circuits, a line circuit for cutting the writer in and the microphone indicating to the caller the number called by electrically operating a signal roller, and a local circuit for cutting-in an auxiliary battery for releasing the starting mechanism for the recorder and for the advancement of the same.

One illustrative embodiment of my invention is represented by way of example in the accompanying drawings, wherein:—

Figure 1 is a diagrammatic view of the device according to the present invention with the multiple switch and the mechanism connected therewith on an enlarged scale. Fig. 2 is a detail view of part of the multiple switch.

My apparatus is connected as follows: Referring to Fig. 1, the numerals 1 and 2 designate the two terminals connected with the telephone of the called subscriber when he is not present and wishes the conversation to

be phonographically recorded should he be called up. In the illustrative embodiment the multiple switch which has to bring about the individual electrical connections between the various devices comprised in the entire apparatus is shown as a two-armed lever 4, 5 mounted to rock about the pivot 3. The arm 4 of this lever carries the armature 6 of the electromagnet 7. The arm 5 of this lever carries at its free end a piece of insulation 11 located in the bend 9 of a contact spring 10 connected to the terminal 8. This spring 10 is normally in contact with the fixed terminal 12 connected with the connection terminal 2. The arm 4 of the multiple switch 4, 5 is likewise connected with the terminal 12 by the contact piece 13 and in this manner with the connection terminal 2. When the multiple switch 4, 5 rocks, the contact piece 13 slides on a contact-piece 14 which is connected with the recorder 1 and with the microphone *s* connected in series therewith.

An electromagnet 15 connects into circuit the mechanism for the acoustic signal. To this end, its armature 16 which is carried by a spring 17 is provided with a pin 18 bent at right angles which actuates the two-armed lever 19. By means of the connecting-rod 32 this lever 19 moves a lever 31 having two projections or detents 33 and 34 which can alternately lock a stop, *e. g.* a small pin 35, fast on the studded cylinder *n*. In order that the two-armed lever 19 actuated by the armature 16 may be returned into its normal position when the electro-magnet 15 is not energized, it is balanced by an adjustable counterweight 36. This lever 19 for actuating the locking and unlocking device for the acoustic signal cylinder *n* is connected by a peculiar lock with the multiple switch 4, 5. Pivoted on the arm 4 is a catch or detent 20 whose movement toward the armature 6 is limited. Namely, this catch is constantly pulled toward its stop 22 on the lever 19 by a coil spring 21. The catch 20 is released by the rectangular member 18 on the armature 16 when this member 18 abuts against a spring-like projection 37 of the catch 20. The multiple switch 4, 5 simultaneously, however, closes the circuit which has to release or stop the clockwork in the casing *f* for driving the cylinders or disks. To this end, a part of the lever arm 4 is

made L-shaped, and the two bars 24 (Fig. 2) forming a channel are preferably made of insulation or must carry insulation. A ball 23 which, in the highest position of the multiple switch 4, 5, electrically connects the terminals 25 and 26 can run on these bars. These terminals are located in the circuit of a battery 27 and are connected with an electromagnet 28 whose spring-pressed armature 29 locks or releases the fly 30 of the clockwork in the casing *f*.

The described apparatus operates as follows:—When the subscriber wishes the conversations with him to be phonographically recorded he connects the terminals 1, 2 with his telephone by means of a change-over switch. At the moment a call is made current flows over terminal 12 by way of the spring 10 to terminal 8, the electromagnet 7 and back to terminal 1. The electromagnet 7 attracts its armature 6; the contact 10, 12 is simultaneously broken so that the electromagnet 7 becomes currentless. At the same moment, however, the circuit containing the terminal 2, contact-piece 13, terminal 14, electromagnet 15 and terminal 1 has been closed. The armature 16 is attracted and drives the lever 19 by the bent member 18. When the circuit of the electromagnet 7 is broken and the two-armed lever 4, 5 tends to return into its normal position, the catch 20, which is constantly pulled by the spring 21 toward the armature 6, abuts against the stop 22 of the lever 19 and prevents the arm 4 descending. The lever 4 is returned into its initial position by means of its own weight, a spring however may be arranged to assist with movement. The contact 13, 14 consequently remains closed. Owing to the movement of the lever 19 the lever 31 is driven and the lower lug 34 releases the stop 35, so that the cylinder *n* can be driven by its own driving mechanism and the number of the called subscriber is communicated to the calling subscriber by means of the microphone *s*. The cylinder *n* rotates until the stop 35 strikes against the upper lug 33 of the lever 31; the acoustic signal is then locked. Current simultaneously flows over the contacts 13, 14 through the recorder *i* and over the microphone *s* back to the terminal 1, so that the conversation of the calling subscriber is recorded by the recorder.

In order that the clockwork for rotating the recording cylinders or disks shall not be started too quickly the multiple switch 4, 5 is provided with a peculiar switching device for closing the circuit for locking the mentioned clockwork. When the armature 6 is attracted by its electromagnet 7 the ball 23 rolls slowly in the channel 24 until it is located between the two contact-pieces 25, 26. The circuit is closed at this moment, the electromagnet 28 attracts the

spring-influenced armature 29 and releases the fly 30 of the clockwork in the casing *f*. The cylinders or disks now rotate and the conversation of the calling subscriber is automatically recorded. As soon as the current at the end of a conversation is interrupted at the contacts 1 and 2, the electromagnet 15 is deenergized and the member 18 of the armature 16 releases the catch 20 from the stop 22 by means of the springs 17 so that the arm 4 of the multiple switch 4, 5, falls down and the circuit is interrupted at the contacts 13, 14.

Owing to the action of the counterweight 36 the lever 19 simultaneously follows the movement of the catch 20. The lever 31 rocks in the opposite direction. The upper lug 33 releases the stop 35 and the cylinder *n* begins to rotate under the action of its clockwork. It is, however, locked again by the lug 34 which holds the cylinder *n* ready for the next conversation. When the arm 4 moves downward the ball 23 rolls back into its normal position and opens the contact 25, 26, so that the clockwork in the casing *f* for driving the talking machine cylinders or disks is locked. The contact 10, 12 is subsequently closed in order to return the entire apparatus into its normal position for a new conversation.

In the illustrative embodiment the switch 4, 5 is formed as a two-armed lever. Obviously, the same can be made in various other forms; likewise, the form of the contacts 10, 12; 13, 14; and 23, 25, 26 is unimportant; these contacts may be substituted by other equivalent means known in the art. Also, the electromagnets 7, 15 and 28 together with their armatures may be formed as solenoids or the like.

I claim:—

1. In an apparatus for phonographically recording telephonic conversations without the aid of the called station, an electromagnetic multiple switch adapted to be operated by the call, a recorder adapted to receive a forward movement, a record for said recorder, an electro-magnet, means for associating said recorder and record and said electro-magnet with a line circuit, a signal roller adapted to be operated by said electro-magnet upon the operation of said switch for indicating to the caller the number called, and an auxiliary battery through which a circuit is closed by said switch for releasing the starting mechanism for the record and for the advancement of the recorder, substantially as described.

2. In an apparatus for phonographically recording telephonic conversations without the aid of the called station, a two-armed multiple switch, an interrupter contact for the circuit of the multiple switch, an electromagnet for said switch, and a spring having a curved portion adapted to receive the in-

sulated end of one of the arms of said multiple switch adapted to cut said electro-magnet out of the calling circuit, substantially as described.

5 3. In an apparatus for phonographically recording telephonic conversations without the aid of the called station, a two-armed multiple switch, an electro-magnet for said switch, means for cutting said electro-magnet out of the calling circuit, a checking and releasing device upon the multiple switch for retaining said switch in operating position upon the deenergizing of said electro-magnet, a signal roller, an electro-magnet for said signal roller, a record roller, an electro-magnet for said record roller, and means for closing the circuits in which said signal and record roller-electromagnets are located while the electro-magnet for the switch is deenergized, substantially as described.

4. In an apparatus for phonographically recording telephonic conversations of the character described, a two-armed multiple switch, a checking lever upon one arm of said multiple switch, a signal roller, an electro-magnet for said signal roller having an armature for arresting said checking lever, and a circuit for energizing said electro-magnet, substantially as described.

5. In an apparatus for phonographically recording telephonic conversations of the character described, a two-armed multiple switch, a signal roller and a record roller, a check lever secured to one arm of said switch, a two-armed weighted lever, an electro-magnet for said signal roller, an armature and an electromagnet for said record rollers, said electromagnet located in one

circuit, means connecting said two-armed lever with said signal roller, means for operating said two-armed lever upon the operation of said armature caused by the opening and closing of the circuit in which said electromagnets are located, and a microphone associated with said signal roller adapted to communicate to the caller the number called, substantially as described.

6. In an apparatus for phonographically recording telephonic conversations of the character described, a two-armed multiple switch, an acoustic signal roller, a stop upon the operating mechanism for the same, a lever, two stops upon said lever for engaging said stop, a recorder, an electro-magnet for said signal roller, intermediate links between said lever and said electro-magnet, and a microphone for communicating said acoustic signal to the calling subscriber and said electro-magnet simultaneously checking the multiple switch, substantially as described.

7. In an apparatus for phonographically recording telephonic conversations of the character described, a two-armed multiple switch, a groove in the upper face of one of said arms, contact pieces at both sides of said arm, a recorder and a signal roller, a clockwork for operating said recorder and record, and means for electro-magnetically locking and unlocking said clockwork, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HANS STARCKE.

Witnesses:

JOSEF E. WALSECK,
LOUIS VANDORY.

The first part of the book is devoted to a general survey of the history of the world, from the beginning of time to the present day. The author discusses the various stages of human civilization, from the earliest times to the modern era. He also touches upon the different religions and philosophies that have shaped human thought and action.

In the second part, the author turns to a more detailed examination of the political and social conditions of the world. He discusses the various forms of government, from monarchy to democracy, and the different social structures that have existed throughout history. He also touches upon the various wars and conflicts that have shaped the course of human events.

The third part of the book is devoted to a discussion of the various sciences and arts that have been developed by humanity. The author discusses the progress of science, from the earliest times to the present day, and the various arts and crafts that have been created by human hands. He also touches upon the various philosophies and religions that have shaped human thought and action.

In the fourth part, the author turns to a discussion of the future of the world. He discusses the various predictions and theories that have been advanced about the future of humanity, and the different ways in which the world might be shaped in the years to come. He also touches upon the various challenges and opportunities that will face humanity in the future.

The fifth part of the book is devoted to a discussion of the various religions and philosophies that have shaped human thought and action. The author discusses the different beliefs and teachings of the various religions, and the different philosophies that have been developed by humanity. He also touches upon the various ways in which these beliefs and teachings have shaped human culture and society.

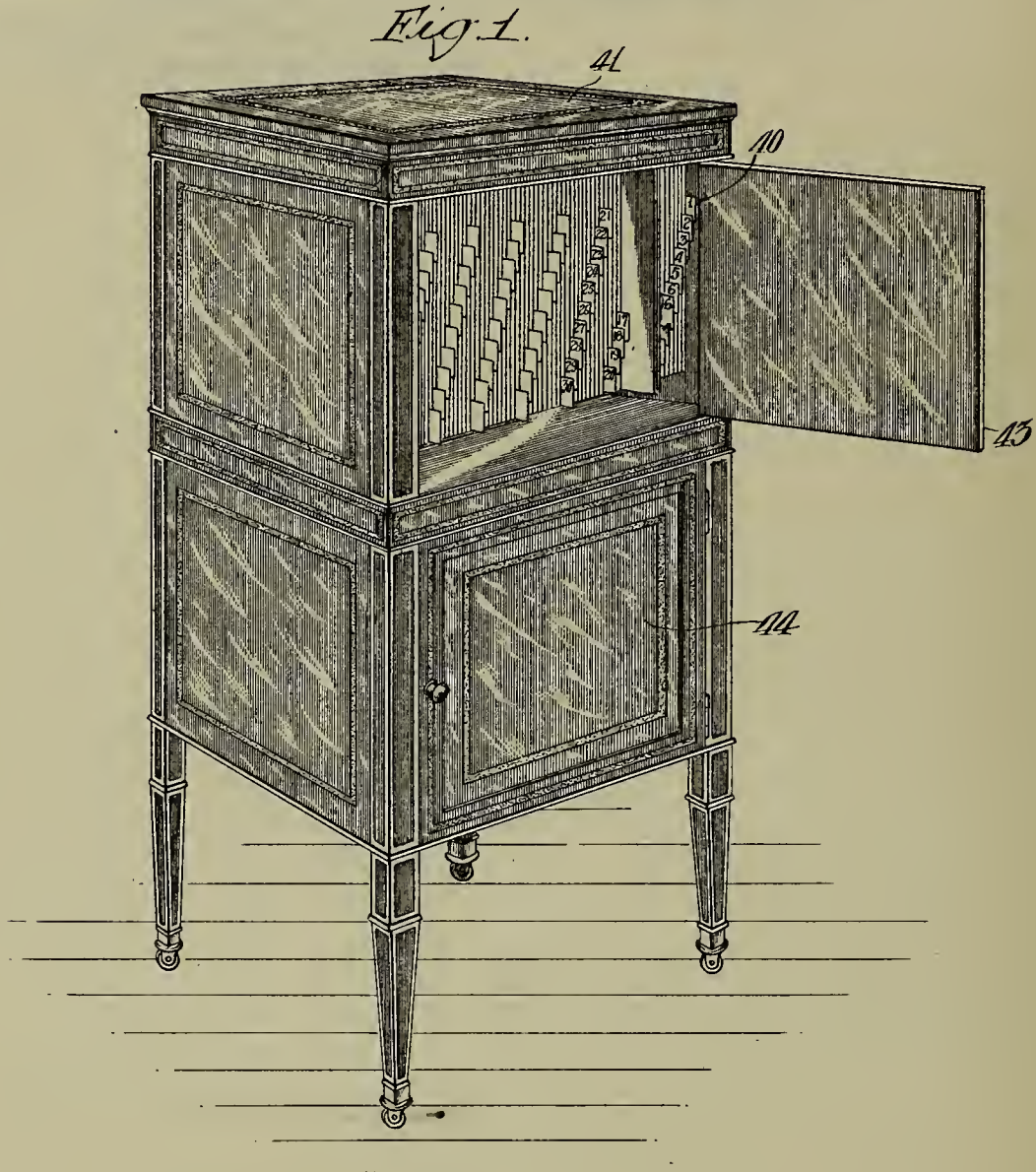
In the final part of the book, the author turns to a discussion of the various ways in which humanity has shaped the world. He discusses the different ways in which human actions have shaped the course of human events, and the different ways in which human culture and society have been shaped by human actions. He also touches upon the various challenges and opportunities that will face humanity in the future.

ORIGINAL RECORDS FILED
FILE FOR SOUND REPRODUCING RECORDS,
#1,186,478-----F. W. Harris,
Patented-June 6th, 1916.
Filed-September 1st, 1915.

F. W. HARRIS.
FILE FOR SOUND REPRODUCING RECORDS.
APPLICATION FILED SEPT. 1, 1915.

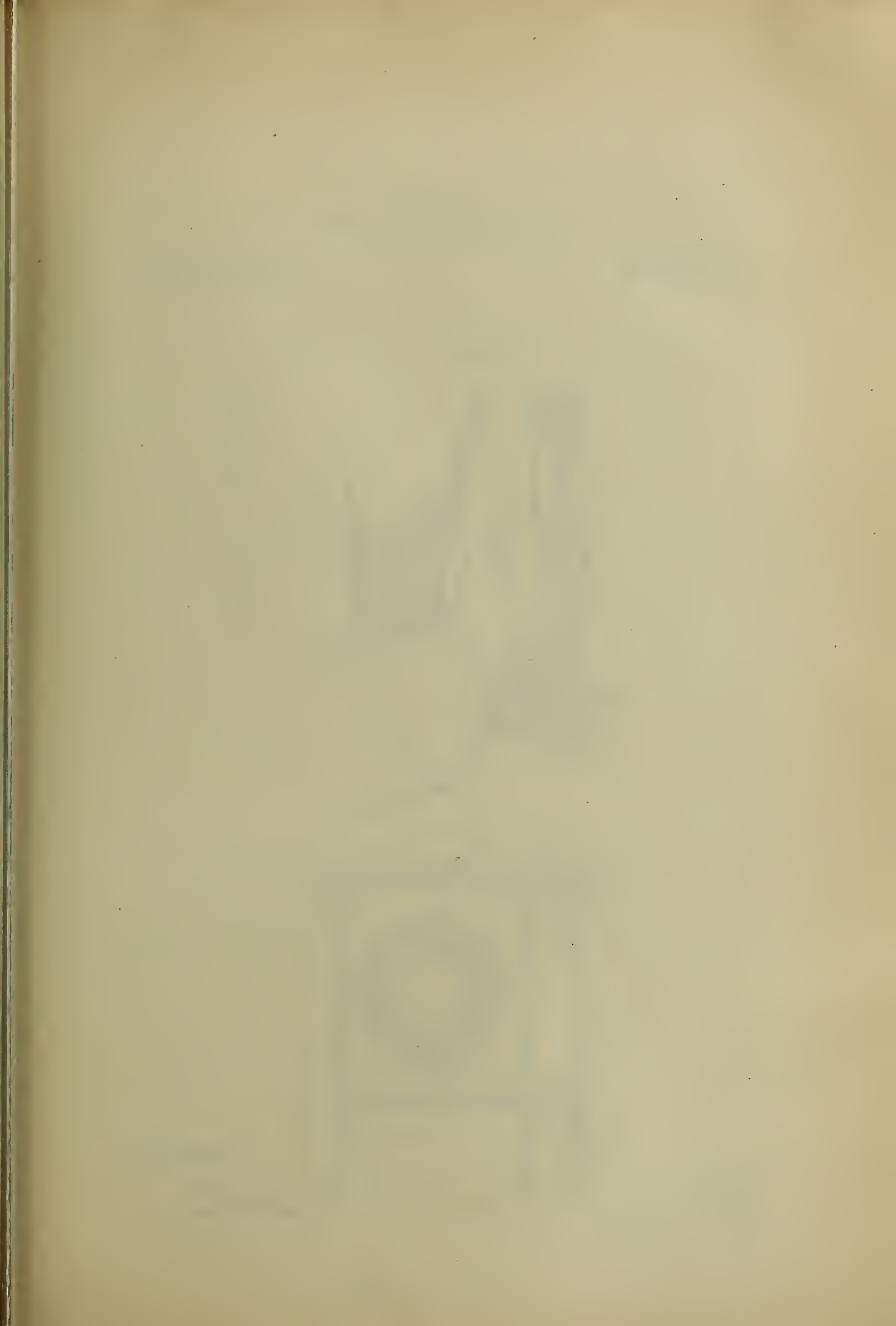
1,186,478.

Patented June 6, 1916.
4 SHEETS—SHEET 1.



Witnesses:-
Louis W. Gratz.
Geo. A. Hark.

Inventor
Ford W. Harris



F. W. HARRIS.
FILE FOR SOUND REPRODUCING RECORDS.
APPLICATION FILED SEPT. 1, 1915.

1,186,478.

Patented June 6, 1916.
4 SHEETS—SHEET 2.

Fig. 13.

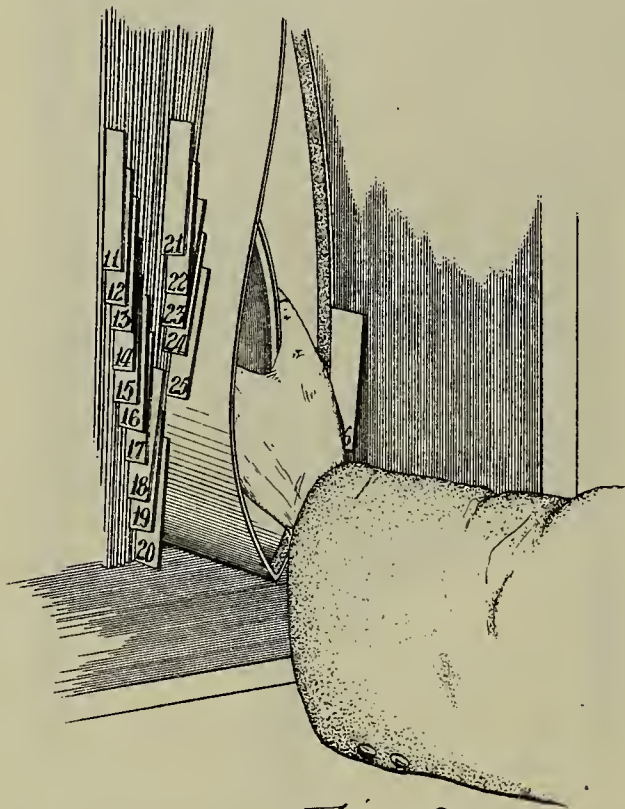
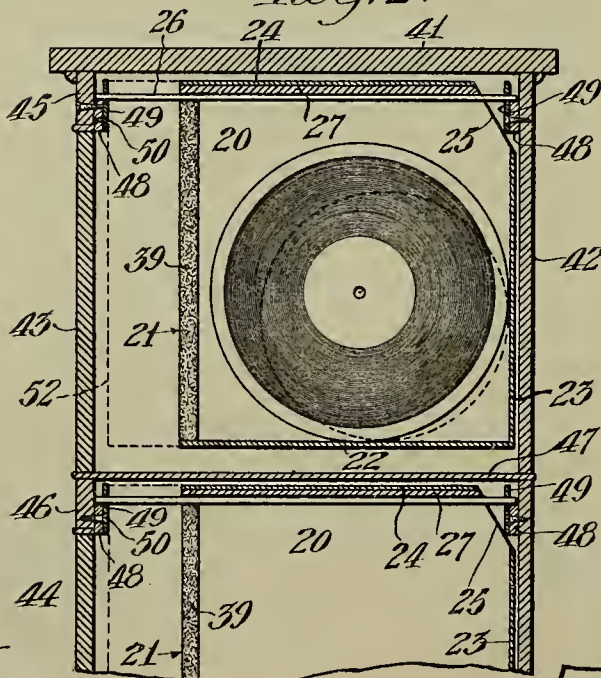


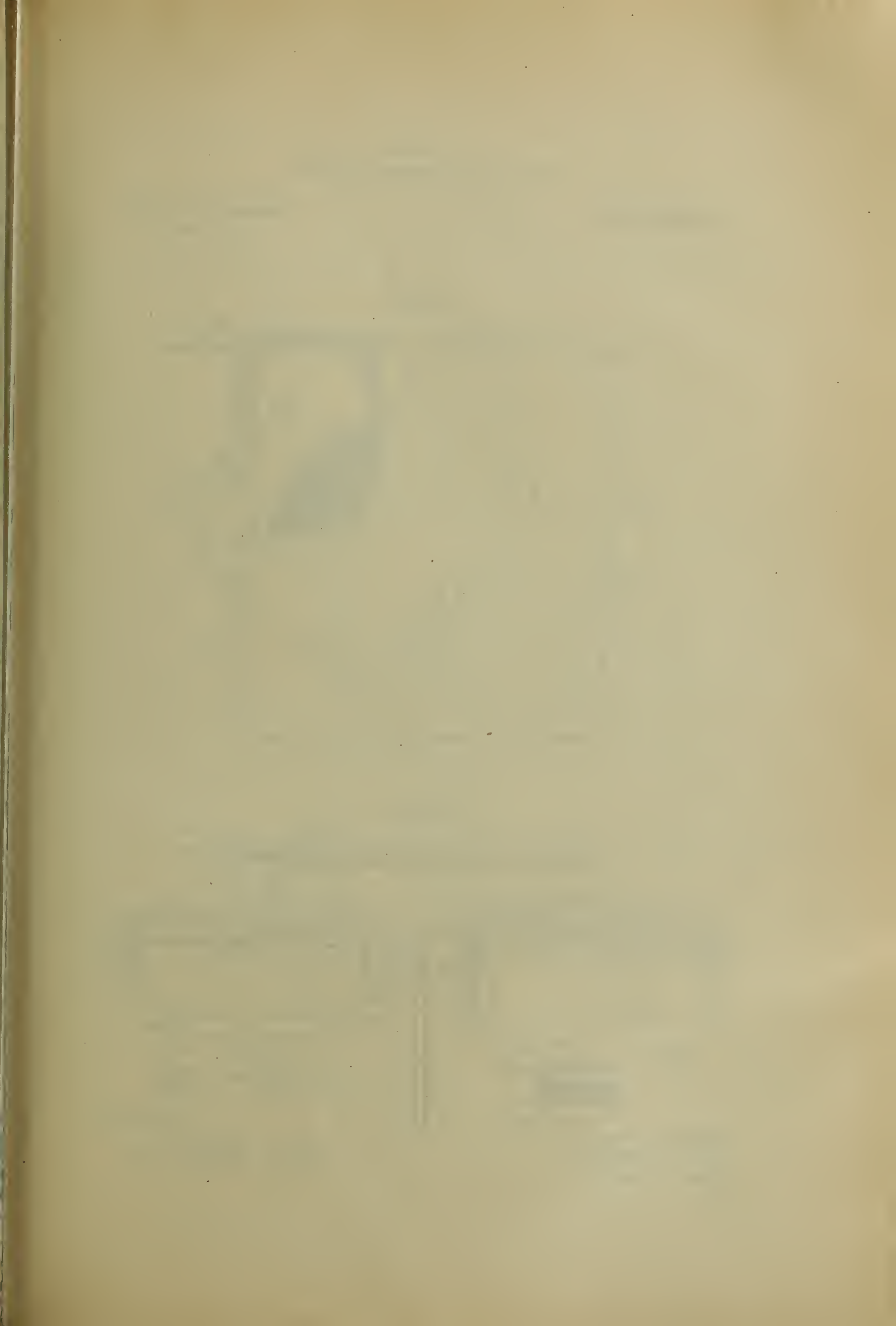
Fig. 2.



Witnesses:
Louis W. Gratz
Geo. A. Hawk

Inventor

Ford W. Harris

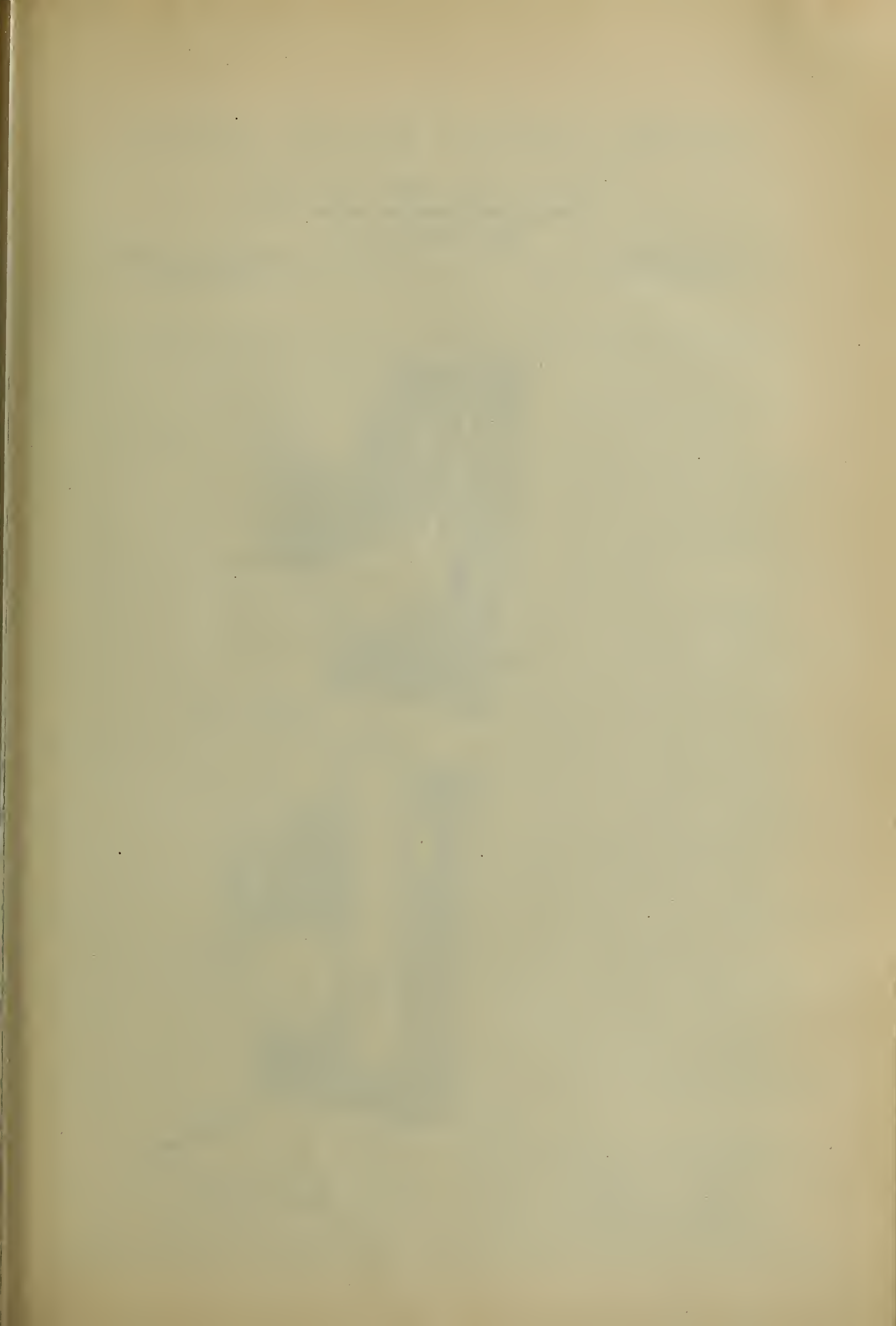


1,186,478.

Fig. 4. Fig. 5. Fig. 6. Fig. 7. Fig. 8. Fig. 9. Fig. 10. Inventor

Witnesses:
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Geo. A. Hawk

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Ford W Hamer



F. W. HARRIS.
FILE FOR SOUND REPRODUCING RECORDS.
APPLICATION FILED SEPT. 1, 1915.

1,186,478.

Patented June 6, 1916.
4 SHEETS—SHEET 4.

Fig. 11.

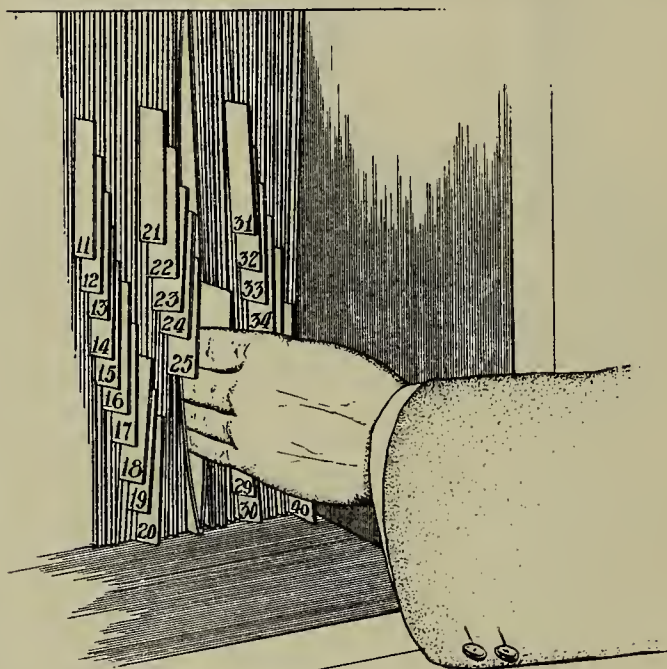
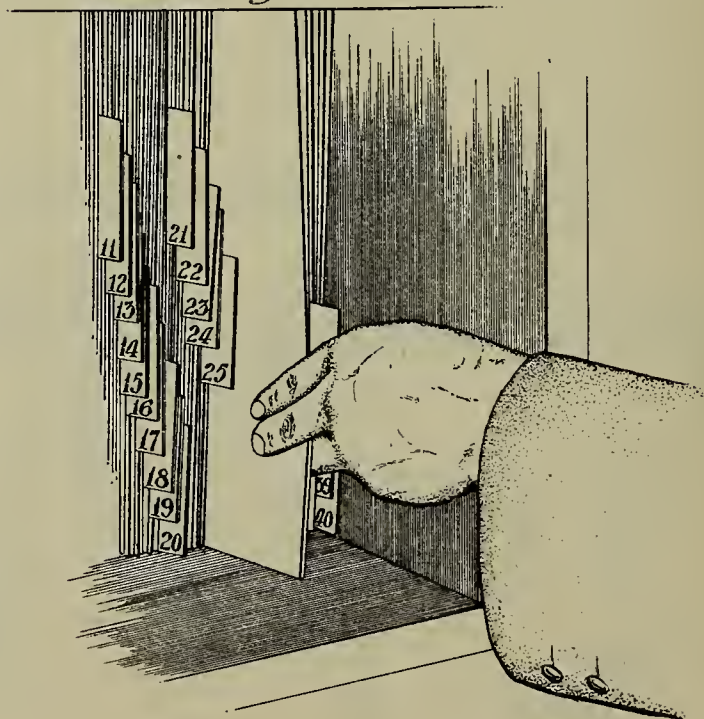


Fig. 12.



Witnesses:
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Inventor
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UNITED STATES PATENT OFFICE.

FORD W. HARRIS, OF LOS ANGELES, CALIFORNIA.

FILE FOR SOUND-REPRODUCING RECORDS.

1,186,478.

Specification of Letters Patent.

Patented June 6, 1916.

Continuation of application Serial No. 693,836, filed April 29, 1912. This application filed September 1, 1915.
Serial No. 48,548.

To all whom it may concern:

Be it known that I, FORD W. HARRIS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented a new and useful File for Sound-Reproducing Records, of which the following is a specification.

My invention relates to the article filing art. In that art primary records are produced by a suitable recorder. These primary records, or secondary records made from them, when used with a suitable reproducer will reproduce to a certain degree the original sounds. The majority of the phonographs now in use employ a flat disk record from one-eighth to five-sixteenths of an inch in thickness, the records being made of molded or cast material and being made commercially in several diameters, twelve inches and ten inches being the most usual sizes. Such records have the reproducing marking indented in spiral grooves on one or both sides of the record. The owner of a phonograph often gets a large collection of these records, and some convenient means for preserving them, so that they are quickly available, is quite essential.

The principal object of my invention is to provide novel means for filing and preserving such disk records. Various methods of filing have already been devised. For example, paper envelops may be used into which the records are slipped. These envelops may then be bound together at one edge into a book and a sufficient number of books may be provided to take care of any desired assortment of records. Such books are objectionable in that they are somewhat expensive and difficult to handle, and in that different sizes of books must be provided for different diameters of records. They are also objectionable in that they are heavy and cumbersome, do not admit of ready indexing, and in that they take up an undue amount of space. For the purpose of overcoming these disadvantages and objections, I have devised the filing means illustrated in the accompanying drawings.

My invention comprises the following novel features: (A) Individual envelops for each record, these envelops being supported solely by an upper edge and being open at a forward edge to permit of the easy insertion and removal of records. (B) Supporting means for each envelop which will

permit it to hang normally in the back of a cabinet or permit it to be drawn to a forward position so that the record can be easily removed. (C) A new form of tab for each envelop by which the contents may be identified. (D) Closure means for the front edge of the envelop so arranged as to exclude dust from the interior of the envelop. (E) Reinforcing means in the top of the envelop on which the envelop slides.

Of the above structural features it is to be noted that features (A) and (B), as well as certain other novel and useful features are disclosed in my application, Serial No. 693,836, filed April 29, 1912, of which this application is a continuation.

In the drawings, which are for illustrative purposes only: Figure 1 is a perspective view of a filing cabinet equipped with my invention. Fig. 2 is a vertical central section through the center of such a filing cabinet showing a record in place therein. Fig. 3 is an enlarged view of one of the envelops used in my invention with its supporting rod, a portion thereof being broken away to better illustrate the invention, and a record being shown in place therein. Fig. 4 is a section on a plane represented by the line x^4-x^4 in Fig. 3. Fig. 5 is a partial section on a plane represented by the line x^5-x^5 in Fig. 3, looking in the direction of the arrows. Fig. 6 is a sectional view of an alternate form of my invention. Fig. 7 is a partial section on the line x^7-x^7 of Fig. 6 looking in the direction of the arrows. Fig. 8 is a view of another alternate form of construction of my invention. Fig. 9 is a view of a novel form of spacing strip. Fig. 10 shows an alternate form of rod used in my invention. Fig. 11 is a perspective view of a cabinet showing the method of taking hold of the individual envelops. Fig. 12 is a view showing an individual envelop withdrawn to the front of the cabinet. Fig. 13 is a view showing the accessibility of the record when the envelop is so withdrawn.

The principal feature of my invention is the form of envelop which is used to contain the record, in combination with the suspension means for the same.

Previous inventors have used flexible or semi-flexible envelops either bound in books supported at the bottom, or sliding in compartments. So far as I am aware I am the

first inventor to use a flexible envelop which is supported wholly from the top.

The preferred form of envelop is illustrated in Fig. 3. The envelop 20 is open along a front edge 21, being closed along the bottom edge 22, the back edge 23 and the top edge 24. An opening 25 is formed at the intersection of the edges 23 and 24, and a supporting rod 26 is passed through the envelop, projecting through the front edge 21 and through the opening 25. A rigid reinforcing member 27, which may be formed of wood in semi-circular form, as shown in Fig. 5, or which may be of canvas, or metal, if desired, is placed inside the top edge 24 above the rod 26. The forward edges 21 may be left plain, or they may preferably be reinforced as shown in the drawing. In either case, a tab 30 is secured to one side of the envelop at the front edge 21. This tab is preferably secured as shown in Fig. 4, in which the sides 31 and 32 of the envelop are bent over as shown at 34 and 35. The tab 30 has projecting ends 36 and an index portion 37. The index portion 37 fits inside of an opening 38 formed in the bend between the side 32 and the member 34. The projecting ends 36 prevent the tab 30 from being pulled through the opening 38. For the purpose of forming a tight closure in the front edge 21 of the envelop, plush members 39 may be used, these members being glued or cemented to the folds 34 and 35. These plush members 39 not only serve to make a dust proof inclosure of the front of the envelop, but they also provide a ready means for brushing any dust from the record as it is inserted in the envelop. The tabs 30 are preferably bent at a slight angle, as shown in Fig. 4, so that they will be more readily visible from the front of the cabinet when properly assembled. The tabs 30 are arranged successively on successive envelops, as shown in Fig. 1, and they are successively numbered as shown at 40, these numbers being visible due to the arrangement of the successive tabs, as illustrated in Fig. 1. The envelops 20 may be readily restrained on the rods 26 so that they cannot slide thereon, and my invention includes any such arrangement. I prefer, however, to arrange the envelops to slide longitudinally of the rods 26.

The envelops are preferably arranged side by side in a cabinet such as that illustrated in Fig. 1, the rods being supported in a number of ways. In the method illustrated in Fig. 2, the cabinet consists of a top 41 having a back 42 and a pair of hinged doors 43 and 44. Supporting strips 45 and 46 extend across the front, and a shelf 47 extends across the cabinet above the strip 46. Supporting members 48 are secured to the strips 45 and 46 and to the

back 42, and perforated metal plates 49 are secured thereto by means of screws 50. These perforated metal plates 49 are illustrated in detail in Fig. 9. In this form of my invention the rods 26 project through small openings 51 punched in the plates 49, these plates serving to support the rods 26 and to prevent them from moving sidewise, so that there is no danger of crowding the envelops 20 to one end or the other of the cabinet. The rods 26 are made of sufficient length to allow the envelops 20 to be pulled forward into the position shown in dotted lines at 52 in Fig. 2. Alternate methods of supporting the rods 26 are illustrated in Figs. 6 and 8. In Fig. 6 supporting members 53 are secured to the member 45 and to the back 42 respectively. A series of small brads 54 are driven upwardly through the strips 53, so that the rods 26 are spaced thereby in their proper relationship and are thereby prevented from moving sidewise. In Fig. 8 the strip 45 and the back 42 have holes 56 and 57 drilled therein through which the rods pass into which they fit. The holes 57 are closed by a plate 58. If desired the strips 53 illustrated in Fig. 6 may be used without the brads 54, in which case the rods 26 are provided with thimbles 58, these thimbles being larger in diameter than the rods 26 and serving to space them apart. When so constructed, the envelops are allowed to have a slight sidewise motion, the thimbles 58 sliding longitudinally of the strips 53.

In the forms of my invention illustrated in Figs. 2 and 6, the corner of the envelop is cut off diagonally about the opening 25 so that the back 23 of the envelop 20 can strike against the back 42 of the cabinet when the envelop is pushed to its extreme rear position. In the form of the invention illustrated in Fig. 8, it is not necessary to so cut the envelop, as it is not necessary to make any projection from the back 42 of the cabinet. The strips 53 and the plates 49 being located at the front of the cabinet serve as a limiting stop against which the envelops may be pulled forward into the position shown by dotted lines at 52 in Fig. 2. The envelops can also be slid back on the rods 26 until they strike on the back 42 of the cabinet.

While I have illustrated in Fig. 1 a preferred form of cabinet having an upper and a lower compartment, it is obvious that my particular form of filing envelop and suspension means therefor can be used in any desired form of cabinet and with any desired number of envelops.

The method of operation of the invention is illustrated in Figs. 11, 12 and 13. The envelops being consecutively numbered, a card or book index is maintained showing in which particular numbered envelop the

desired record is held. While I prefer to file each record in its individual envelop, it is of course obvious that where a cheap cabinet is required more than one record can be filed in an envelop if desired. The user of the cabinet having determined from his index the number of the envelop containing the desired record, he proceeds to draw the envelop forward by seizing the numbered tab as shown in Fig. 11 and drawing it to its extreme forward position, as illustrated in Fig. 12. The envelop then being well advanced from its fellows, it is possible for him to insert his hand into the envelop, as shown in Fig. 13, and to withdraw the record therefrom. Figs. 11, 12 and 13 are made from actual photographs. It is, of course, not necessary to insert the hand as far as is shown in Fig. 13 unless it is desired to do so, it being possible to catch the record between the thumb and fingers. The record is then drawn forward out of the envelop, the envelop remaining stationary in the front of the cabinet as shown in dotted lines at 52 in Fig. 2, and as shown in Figs. 12 and 13. As soon as the user has finished playing the particular record, he slips it back into the envelop, the tab 30 serving as a guide to direct the edge of the record into the space between the sides 31 and 32. As the record slides into the envelop the cloth members 39 brush any dust which may have accumulated from the surface of the record, the record sliding back into the position shown in Fig. 3. In Fig. 3 the largest size of commercial record is shown in place in the standard envelop. The length of the envelop is sufficient to allow the record to pass entirely by the plush members 39 so that they can close, thus excluding any dust from the interior of the envelop and record.

The envelop 20 may be made of comparatively light and tough paper, as the weight of the record tends to hold the sides straight.

While I have illustrated in Fig. 3 an envelop containing the largest size of commercial record, it is possible to file therein records of such smaller diameter, as shown by the dotted lines 60 of Fig. 3. In practice the twelve inch record is at present the largest commercial size. Ten inch records, indicated approximately by the dotted lines 60 of Fig. 3, are quite common, and six inch records, as indicated by the dotted lines 61 of Fig. 3, are also coming into general use. Any of these three sizes can be filed in any envelop, and it makes no difference whether these envelops are of the least commercial thickness, or whether they are five-sixteenths of an inch in thickness, this being the thickness of the Edison disk record, which is the heaviest make being shown in commercial quantities.

It is extremely common for the user of a phonograph to have quite a large number of records of a single production, such as an opera, and it is desirable that these records all be filed together. It very often happens that they are of different diameters and thicknesses, and it is obvious that were the envelops not suited to any size of record that it would be impossible to accomplish this. By the use of my cabinet the greatest space economy is attained, as the records hang side by side, separated only by two thin thicknesses of paper. All the other advantages mentioned in the preamble of the specification are also attained, as will be readily understood from the foregoing description.

While I have illustrated and shown certain preferred embodiments of my invention, I do not wish to be understood as limiting myself to these particular embodiments, and I desire that the scope and limitations of my invention be governed wholly by the annexed claims.

I claim as my invention:—

1. A filing cabinet for flat circular phonograph records comprising a supporting structure, a series of envelops each of sufficient size to contain at least one of said records, each of said envelops having an opening in a vertical edge through which a record can be inserted or removed, and a supporting rod for each of said envelops on which each of said envelops is hung, each of said rods being supported by said structure.

2. A filing cabinet for flat circular phonograph records comprising a supporting structure, a series of envelops each of sufficient size to contain at least one of said records, each of said envelops having an opening in a vertical edge through which a record can be inserted or removed, and a supporting rod for each of said envelops on which each of said envelops is hung, each of said rods being supported by said structure, and each of said envelops being free to slide longitudinally on its supporting rod.

3. A filing cabinet for flat circular phonograph records comprising a supporting structure, a series of envelops each of sufficient size to contain at least one of said records, each of said envelops having an opening in a vertical edge through which a record can be inserted or removed, and a supporting rod for each of said envelops on which each of said envelops is hung, each of said rods being so secured to said supporting structure that said rod cannot move with relation to the structure.

4. In a filing cabinet having a plurality of suspended envelops, a supporting means for each envelop comprising a rod adapted to be slipped through the top of the envelop, and spacing means for holding the rods apart.

5 5. A filing cabinet comprising a supporting structure, a series of envelopes each having an open vertical edge, and a series of supporting members supported in said structure, each of said envelopes being supported by one of said members.

10 6. A filing cabinet comprising a supporting structure, a series of envelopes each having an open vertical edge, and a series of supporting rods supported in said structure, each of said envelopes being supported by one of said rods.

15 7. A filing cabinet comprising a supporting structure, a series of envelopes each having an open vertical edge, and a series of supporting members supported in said structure, each of said envelopes being supported by one of said members and being free to slide thereon.

8. A filing cabinet comprising a supporting structure, a series of envelopes each having an open vertical edge, and a series of supporting members supported in said structure, each of said envelopes being supported by one of said members and being free to slide thereon, each of said members being rigidly fixed in said structure. 20 25

9. A filing cabinet comprising a supporting structure, a series of envelopes, each having an open vertical edge, and means for hanging each of said envelopes in said structure in such a manner that each envelop can slide in its own plane in the structure. 30

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 25 day of August, 1915. 35

FORD W. HARRIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SYNCHRONIZER FOR TALKING PICTURES,
#1,186,494-----J. B. Olinger,
Patented-June 6th, 1916.
Filed-April 4th, 1913.

J. B. OLINGER.
 SYNCHRONIZER FOR TALKING PICTURES.
 APPLICATION FILED APR. 4, 1913.

1,186,494.

Patented June 6, 1916.
 2 SHEETS—SHEET 1.

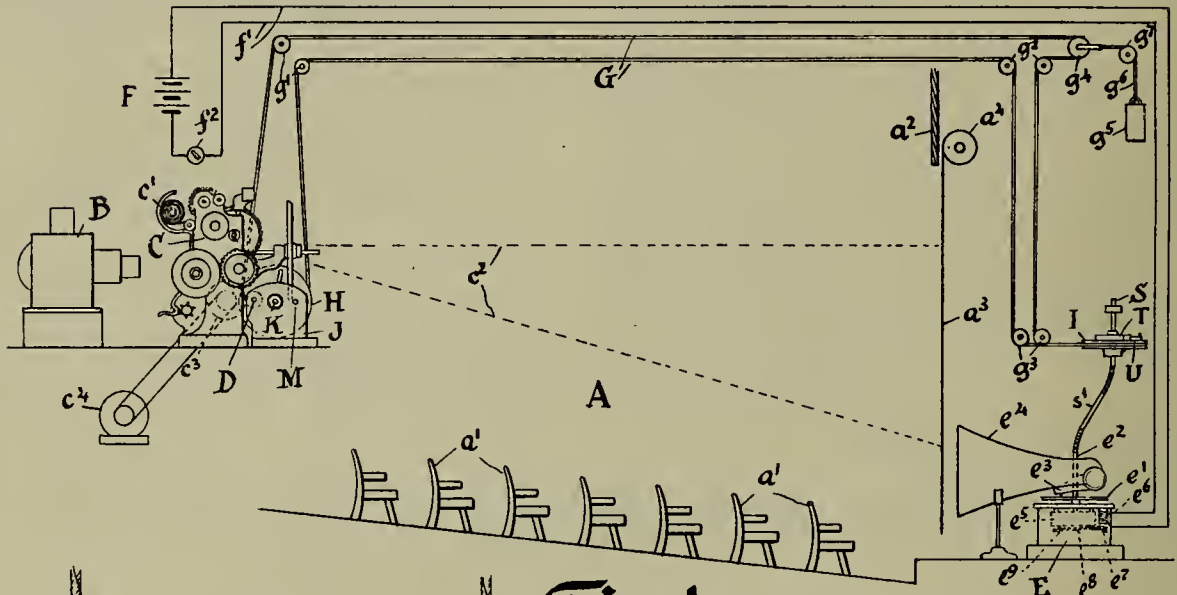


Fig. 1

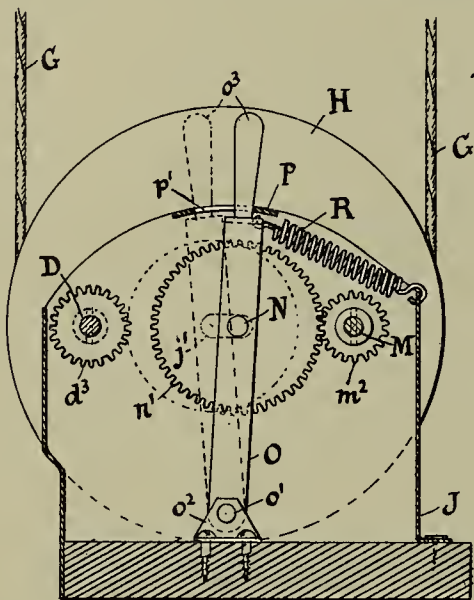


Fig. 2

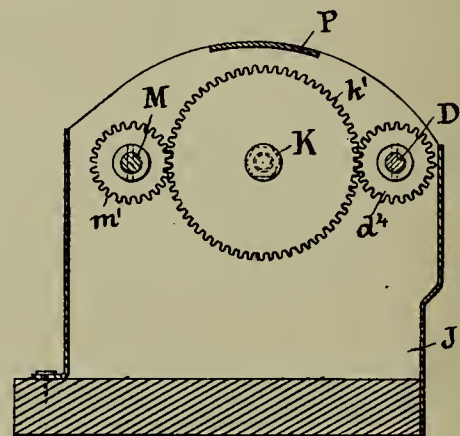


Fig. 3

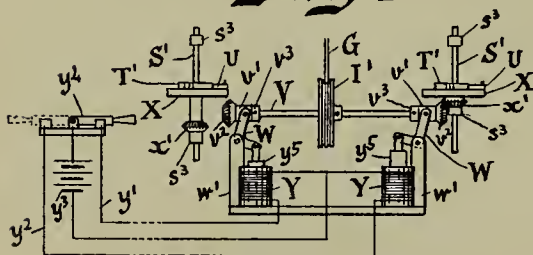


Fig. 8

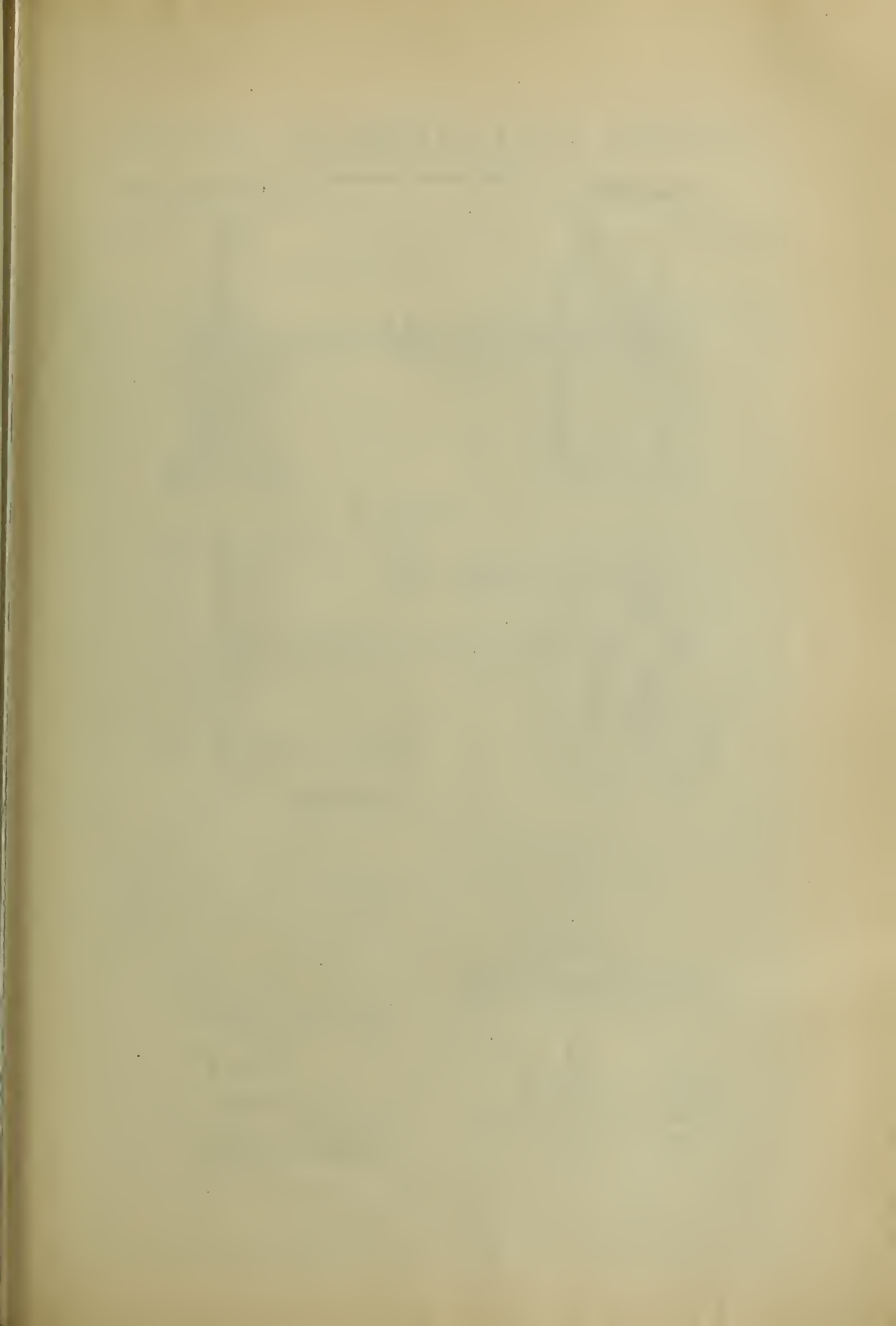
Jean B. Olinger,

Inventor

Witnesses

Frederick H. Decker
Eleanor T. Pink

By *Charles H. Moore*
 Attorney



1,186,494.

Patented June 6, 1916.
 2 SHEETS—SHEET 2.

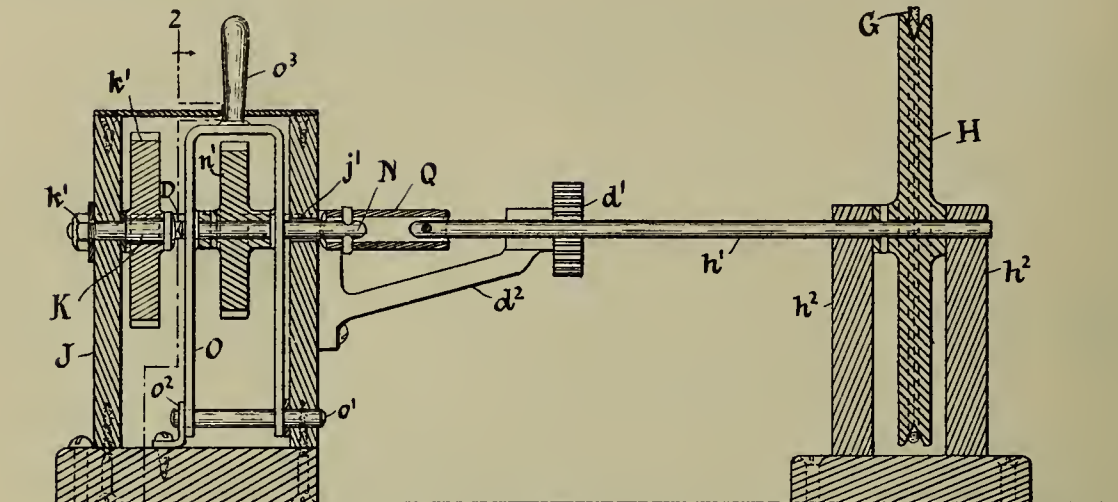


Fig. 4

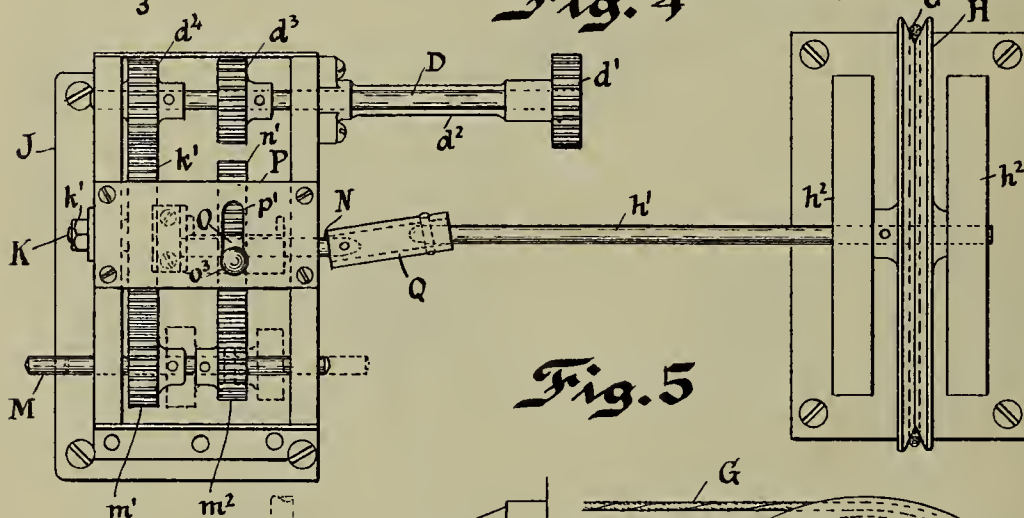


Fig. 5

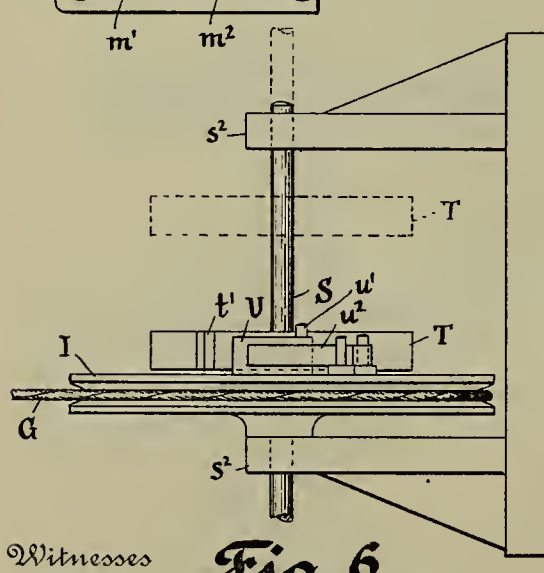


Fig. 6

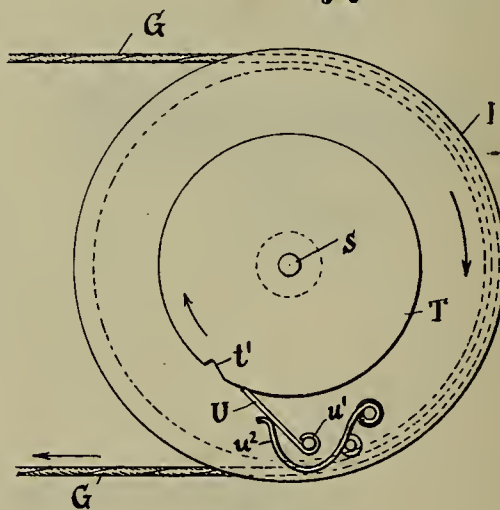


Fig. 7

Witnesses
Frederick D. Tucker
Eleanor T. Fink

Jean B. Olinger, Inventor
 By *Lynde S. Morello* Attorney

UNITED STATES PATENT OFFICE.

JEAN B. OLINGER, OF MILWAUKEE, WISCONSIN.

SYNCHRONIZER FOR TALKING-PICTURES.

1,186,494.

Specification of Letters Patent.

Patented June 6, 1916.

Application filed April 4, 1913. Serial No. 758,761.

To all whom it may concern:

Be it known that I, JEAN B. OLINGER, of Milwaukee, Wisconsin, have invented a Synchronizer for Talking-Pictures, of which the following is a specification.

This invention relates to devices for operating a phonograph in connection with a kinetoscope or moving-picture machine in such manner as to give a second-record corresponding to the acts and speech of the characters thrown on the screen by such machine.

The object of my invention is to provide a simple device, mechanically operated, which shall enable the operator of a moving-picture machine from his booth to control a phonograph producing a record corresponding to the film which he is exhibiting and to bring the two into strict conformity; to enable relative speeds of the moving picture machine and phonograph to be controlled so that they shall be exactly equal; and in case either gets ahead of the other, to bring them back into conformity by a slight manipulation.

My invention comprises the constructions, arrangements and combinations hereinafter set forth and particularized in my claims, reference being had to the accompanying detailed description of a particular embodiment of my invention, and to the accompanying drawings, wherein—

Figure 1 is a more or less schematic view in side elevation exhibiting the necessary apparatus arranged with it in relation to an auditorium, but without preserving the exact relative dimensions of the parts; Figs. 2 and 3 are each transverse sections on the stepped plane 2, 3 of Fig. 4, the former looking in the direction of the upper arrow and the latter in that of the lower arrow, of the element of my synchronizer which is located in the operator's booth; Fig. 4 is a longitudinal vertical section through the same on a medial plane; Fig. 5 is a plan view of the same; Figs. 6 and 7 are respectively a side elevation and a plan of the other element of my synchronizing device which is directly connected with the phonograph. Fig. 8 illustrates a manner of controlling two phonographs successively or alternatively.

In these drawings each reference letter or numeral refers to the same part wherever used.

Fig. 1 represents an auditorium A which may contain seats a' for spectators and in

the front thereof, behind the proscenium a^2 , is hung the screen a^3 upon a suitable roller a^4 or otherwise, these elements forming no part of my invention and being merely illustrative of the application thereof. At some point in the rear of the auditorium, customarily in an inclosure known as the operator's box, is located a projector B and a moving picture machine C through which is carried a film c' which passes across the beam of light thrown by the projector B and thereby projects upon the screen a^3 an image of the successive pictures on the film, represented by the dotted lines c^2 . The particular type of projector and moving-picture machine which may be adopted is entirely immaterial to my invention, but it is supposed to have a gear-wheel c^3 or other mechanical element adapted to drive the driving-shaft D of one element of my synchronizer, and in the present case this driving-shaft D is represented as carrying a gear d' adapted to intermesh with the gear c^3 on the moving-picture machine C. It will, of course, be understood, that where no convenient gear is present on the moving-picture machine, a special gear may be mounted on one of the shafts thereof, or any positive driving-means whatever, many of which are well-known to the mechanic arts, may be adopted for communicating motion from the moving-picture machine to the driving-shaft in a fixed and predetermined ratio. The moving-picture machine may be driven by a motor c^4 . At the rear of the screen a^3 , or any other convenient point supposed to be distant from the operator's box, and preferably at such point that the sound will appear to come directly from the screen, is located a phonograph or any kind of talking-machine E. That here illustrated is one of the gramophone type, having the sound-record on a horizontal disk e' which turns upon a vertical shaft e^2 rotated by a motor e^5 within the phonograph-box E; but it will be readily understood by those skilled in the art how the synchronizer may be adapted to any other type of talking-machine by properly changing the disposition of the elements. For the sake of illustration, the phonograph is shown as having a needle or vibrating point e^3 which delivers the sound into a resonance-horn e^4 .

It will be understood that the film and sound-record correspond with each other, so that when they are driven at the proper re-

spective speeds the sound appears to come from the characters or persons whose images are thrown on the screen. In order to do this, three things are necessary to be observed: (1) that the film and the sound-record commence at the same time; (2) that they commence at the corresponding point of each; and (3) that the two machines be driven at the same relative speed. In order to effect the first, I provide an electromagnetic starting-device for the motor e^5 in the box E, and operating means consisting of a battery or other source of electricity F, an electric circuit consisting of wires f' extending from the box E to a point adjacent to the moving-picture machine and containing the battery and electro-magnetic release and a switch f^2 adapted to close or open the circuit, said switch being located in such position that it may be manipulated to turn on the circuit at the same moment that the moving picture-machine is started. The said electromagnetic device may comprise an electromagnet e^6 and pivoted armature e' carrying an arm e^8 adapted to releasably engage a moving part e^9 of the motor, but any similar device may be employed. It will be understood that if the phonograph is driven by an electric motor, it will be merely necessary to place said motor in circuit with the wires f' , and if it be driven, as I prefer to have it, by a spring or other independent motor then the electromagnetic device in series with the wires f' simply removes a dog from some revolving element of the motor which permits it to run. By this means the phonograph can be started by simply turning the switch f^2 and thereupon the record-disk e' will be set in motion and the phonograph will begin to talk according to the record.

In order to assure that the film and sound-record begin at the same point of the "story" a notch or mark is made in the corresponding point of each where they are to begin and these points are set in advance of the start opposite points marked on the respective housings or casings of the two machines.

It remains to be shown how the two machines can be brought into exact synchronism if they are slightly displaced from one another at the start or if they should become so in the course of operation. This is effected by my synchronizer. The synchronizer comprises two elements, one of which is located in the operator's box and is driven from the moving-picture machine, and the other adjacent to the phonograph behind the screen a^3 , the two devices being operatively connected by means of a cord or other flexible connection G which passes around pulleys H and I on the two devices respectively and around any required number of intermediate guide-pulleys g' , g^2 , g^3 . In order to keep the tension on the cord G constant, it passes at one point of its circuit around

a tightening-pulley g^4 which is yieldingly held in tension by a weight g^5 secured to a cord g^6 passing over the guide-pulley g^7 , or an equivalent mechanical arrangement is adopted.

The pulley or sheave H which drives the pulley or sheave I is mounted on a shaft h' supported on bearing-pedestals h^2 , and it is itself driven from the shaft D by the following arrangement. Within a box or housing J are rotatably mounted the shaft D, a stub-shaft K, a longitudinally shifting counter-shaft M, and a laterally shiftable shaft N. The shaft D turns in bearings in the box J and on a bearing-bracket d^2 , and carries two gears d^3 and d^4 , preferably of equal size. With the gear d^4 meshes continuously an idle gear k' , which turns upon the stub-shaft K, the latter being fixed in position in the side of the box J by a nut k on its screw-threaded outer end. With the gear k' meshes on the opposite side from the gear d^4 a gear m' which is of the same size as the gear d^4 and is keyed to the shaft M, which latter rotates in bearings in the box J and is also adapted to slide laterally therein as indicated by the dotted-line position in Fig. 5. On this shaft M is also keyed another gear m^2 , which is smaller than the gear d^3 and located in line with the latter when in operative position.

Upon a pin o' , which is mounted in the side of the box J and upon a pedestal o^2 , is pivotally mounted a forked standard O which has a handle o^3 projecting through a slot p' in a plate P which lies on top of the box J and is secured to the two sides thereof. The standard O carries the shaft N journaled therein, said shaft projecting through a suitable slot j' in the rear side of the box J and being connected with the shaft h' by any kind of flexible-coupling-member Q, such as an Oldham's coupling, Hooke-joint, flexible shaft or any other well-known method, thus enabling the shaft N to shift laterally while driving the shaft h' . On the shaft N is mounted a gear-wheel n' , which is of such diameter that it can mesh with either of the gears d^3 , m^2 , but not with both at the same time. When thrown to the right as seen in Fig. 2, the gear n' meshes with the gear m^2 and is out of mesh with the gear d^3 , and when thrown to the left by means of the handle o^3 , said gear n' meshes with the gear d^3 and is out of mesh with the gear m^2 . Said gear n' is normally held in mesh with the gear m^2 by means of a coiled tension spring R, which engages with the standard O and one side of the casing, said spring being omitted in Fig. 5 to avoid obscuring the parts below it. When, however, the shaft M is shifted so as to occupy the dotted line-position in Fig. 5, the two gears m' , m^2 will be out of line with the respective gears

h' , n' , and the latter will no longer be driven. In this case, the movement of the gear n' is limited by the contact of the handle o^3 with the end of the slot p' , so that the gears m' and m^2 are thrown into mesh again simply by sliding the shaft M back. It will be noted that this arrangement gives normally a certain speed of rotation to the shafts N, h' which is increased by throwing the handle o^3 over to the left and is reduced to zero by shifting the shaft M into the dotted line position. Thus the speed of the shaft h' can be accelerated or reduced at will. The reduction can also take place by holding the handle o^3 in the middle so that the gear n' will be out of driving contact with either of the gears d^3 , m^2 . The other element of my synchronizer, located over the phonograph-box E, comprises the sheave or pulley I and an extension S of the motor-shaft e^2 of the phonograph on which said sheave I turns loosely. This extension S is preferably located somewhat out of line with the shaft e^2 and is connected therewith by a flexible shaft section s' or similar driving-device so as to enable the cover of the phonograph to be raised up without disconnecting the shaft S from it. The shaft S carries a disk T fixed to it and having a notch t' at the point of its circumference, with which engages in the driving-direction a pawl U mounted upon a pin u' on the sheave I and pressed against the disk T by a spring u^2 . The shaft S is supported in bearings s^2 which are disposed some distance apart so as to enable the shaft with the disk T to be raised when the phonograph record is changed or for any other purpose by the attendant, thus carrying the disk T out of engagement with the pawl U. The motor e^5 of the phonograph is set so as normally to turn the record-disk e' at a rate very slightly lower than the rate of rotation at which the sheave I is driven when the positions of the parts are as shown in full lines of the drawing. Then as the sheave I rotates, it will gradually creep up upon the disk T until the pawl U engages in the notch t' thereof, and thereafter the movement of the phonograph-motor will be very slightly accelerated by the power driving the moving-picture machine so as to make them rotate in exact synchrony, and supposing the film and sound-record correspond condition of things is as it should be. But if the sound-record is slightly ahead of the film they are brought into harmony by shifting the shaft M longitudinally so that the driving-power of the sound-record is diminished by the amount which it takes from the power driving the moving-picture machine, and the speed of the latter by so much increased. This will very quickly bring up the film into unison with the sound-record, and as

soon as this takes place, the shaft M is shifted back again and the synchrony in rotation thus established will be maintained by the engagement of the pawl U in the notch t' . If, on the other hand, the sound-record lags behind the film, the standard O is shifted by means of the handle o^3 to the left, so that the gear n' engages with the gear d^3 , which increases the rate of rotation of the shaft h' , sheaves H and I, disk T and motor-shaft e' relatively to that of the moving-picture machine, and this condition is maintained until uniformity between film and sound-record is reestablished, when the standard O is allowed to be pulled back by the spring R to the normal position. By these manipulations an operator, with a little experience, can keep the sound-record in practical uniformity with the film, retarding or accelerating it as required, so that no substantial lack of conformity will be observed by the audience. When it is desired to run a film without the phonograph record, it is merely necessary to raise the shaft s and disk T to the dotted-line position in Fig. 6.

In some cases, it is desirable to use two phonographs in connection with the same moving-picture machine which are alternatively thrown into operation either for the same film or for successive films. I have accomplished this by means of my improved device shown in Fig. 8. In this case the place of the sheave I is taken by the sheave I' mounted on the ends of two bell-crank levers W, pivotally supported on standards w' or otherwise. The shaft V carries on its ends two bevel-gears v^2 , which lie on one side of the respective bearings v' , and on opposite sides thereof are collars v^3 so that when the levers W turn about their pivots they carry the shaft V longitudinally in one direction or the other. Mounted opposite the ends of the shaft V are two vertical shafts S', said shafts being supported in bearings s^3 and being vertically movable and carrying notched disks T' the same as the disk T. These shafts S' replace the single shaft S in Fig. 1 as extensions of the motor-shafts of two phonographs E not shown in the drawing. The place of the sheaves I is taken by a disk X mounted to turn freely on each of the shafts S' which carries a spring pressed pawl, the same as the sheave I, and also has rigidly connected thereto, a bevel-gear x' ; these bevel-gears being adapted to mesh alternatively with the gears v^2 , but one is located above, the other below, the shaft V, to insure the two shafts S' being driven in the same direction.

The bell-crank levers W are arranged to be operated by two solenoids or electromagnets Y, which are connected to two different circuits y' , y^2 , each operated by the

same battery and closed by a change-over switch y^4 which may be located in the operator's booth. Each of the solenoids or electro-magnets Y^4 has an armature y^5 which swings from the free end of the corresponding bell-crank lever W . Now when the switch y^4 is thrown to one side, as for example the full-line position in Fig. 8, it is obvious that the corresponding electro-magnet Y will be energized to draw down its armature y^5 while the other electro-magnet Y will release its armature, the circuit y^2 thereof being open. This will result in shifting the shaft V toward the right into the position shown in the figure, thus causing the shaft V to drive the gear x' and the shaft S' on the right, and the phonograph connected therewith, while at the same time the other gear x' is disengaged and the corresponding phonograph stopped. A reversal of these operations will take place by throwing the switch y^4 over toward the left. By means of this arrangement it is possible to adjust one phonograph and place a new record in position while the other phonograph is running, and as soon as the end of the record on the latter is reached, the operator immediately throws over the switch y^4 thus continuing the sound-record on the other phonograph without apparent interruption, and the sound-record on the first phonograph can now be again adjusted or changed and so on indefinitely.

While I have hereinabove shown the most improved form of my invention, I wish it understood that not all of the features are essential thereto or necessarily made in exact form shown, but various changes and modifications in the constructions as herein shown may be made without departing from the spirit of my invention, and I wish it understood therefore that the latter is not otherwise limited than by the scope of my claims.

In the following claims the word phonograph is intended to apply to any kind of a talking-machine and not a machine of a particular type.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. The combination of a moving-picture machine, a phonograph having a motor operating it in approximate synchrony with said machine, and a synchronizing device mechanically connecting the two and embodying clutch-mechanism normally inoperative, and thrown into operation by the departure of the speeds of the two machines from synchronism to give a slight acceleration to said phonograph whenever it would otherwise retard behind synchrony with the picture machine.

2. The combination of a moving-picture machine having means for operating it at a

predetermined speed, a phonograph having a motor-device for operating it in approximate synchrony with said moving-picture machine, and means to accelerate the speed of the phonograph, embodying a device normally inoperative and thrown into operation by the departure of the speeds of the two machines from synchronism and adapted to transfer a variable part of the power of the moving-picture motor to the phonograph.

3. The combination of a moving-picture machine having means for operating it at a predetermined speed, a phonograph having a motor-device for operating it in approximate synchrony with said moving-picture machine, a mechanical connection between the motor of said moving-picture machine and the motor of said phonograph and an adjustable element in said mechanical connection adapted to transfer a variable requisite part of the power of one of said motors to the other machine to accelerate the speed of the latter.

4. The combination of a moving-picture machine having means for running it at a predetermined speed, a phonograph having a rotating shaft and means for running it at a predetermined speed, a rotating-member surrounding said shaft and freely turnable thereon, mechanical driving-means connecting said rotating member with said moving-picture machine to drive it in the same direction as said shaft and at approximately the same speed, and a one-way driving-connection between said rotating-member and said shaft permitting the shaft to turn faster than the member.

5. The combination of a moving-picture machine having means for running it at a predetermined speed, a phonograph having a rotating shaft and means for running it at a predetermined speed, a rotating-member surrounding said shaft and freely turnable thereon, mechanical driving-means connecting said rotating member with said moving-picture machine to drive it in the same direction as said shaft and at approximately the same speed, a member carried by said shaft having a notch in one side thereof and a spring-pressed pawl carried by said rotating member and adapted to engage in said notch and drive said shaft only in the driving-direction.

6. The combination of a moving-picture machine having a moving element and means for operating said machine at a predetermined speed, a phonograph having a shaft and means for turning it at a predetermined speed, an auxiliary shaft, a mechanical driving-connection between said auxiliary shaft and said phonograph-shaft and a normally inoperative driving connection between said auxiliary shaft and said movable element of the moving-picture machine and thrown into operation by the departure of the speeds of

the two machines from synchronism to accelerate the speed of the phonograph.

7. The combination of a moving-picture machine having a movable-element and means for operating said machine at a predetermined speed, a phonograph having a shaft and means for turning it at a predetermined speed, an auxiliary shaft, normally inoperative motor-transferring means interposed between said auxiliary shaft and said phonograph-shaft and thrown into operation by the departure of the speeds of the two machines from synchronism, a gear-wheel mounted on said auxiliary shaft for driving it, said gear-wheel being shiftable in its own plane, a pair of gear-wheels with either of which said first-named gear-wheel is adapted to mesh alternatively, and means for driving said pair of gear-wheels from said moving-picture machine at speeds adapted to impart different velocities to said first-named gear-wheel.

8. The combination of a moving-picture machine having a movable element and means for operating said machine at a predetermined speed, a phonograph having a shaft and means for turning it at a predetermined speed, an auxiliary shaft, a one way driving-connection between said auxiliary shaft and said phonograph-shaft, a gear-wheel mounted on said auxiliary shaft for driving it, said gear-wheel being shiftable in its own plane, a pair of gear-wheels with either of which said first-named gear-wheel is adapted to mesh alternatively, means for driving said pair of gear-wheels from said moving-picture machine at a speed adapted to impart different velocities to said first-named gear-wheel, and means normally holding said first-named gear in mesh with one of said pair of gear-wheels.

9. The combination of a moving-picture machine having a movable element and means for operating said machine at a predetermined speed, a phonograph having a shaft and means for turning it at a predetermined speed, an auxiliary shaft, an independently rotatable member on the shaft of said phonograph, a mechanical connection between said auxiliary shaft and said rotating member, a one-way driving connection between said rotating member and said phonograph-shaft, and a variable-speed driving-connection between said auxiliary shaft and said moving-picture machine.

10. The combination of a moving-picture machine having a movable element and means for operating said machine at a predetermined speed, a phonograph having a shaft and means for turning it at a predetermined speed, an auxiliary shaft, an independently rotating member on the shaft of said phonograph, a mechanical connection between said auxiliary shaft and said rotating member, a one-way driving-connection between said rotating member and said phonograph-shaft, a gear-wheel mounted on said auxiliary shaft for driving it, said gear-wheel being shiftable in its own plane, a pair of gear-wheels with either of which said first-named gear-wheel is adapted to mesh alternatively, and means for driving said pair of gear-wheels from said moving-picture machine at speeds adapted to impart different velocities to said first-named gear-wheel.

tion between said rotating member and said phonograph-shaft, a gear-wheel mounted on said auxiliary shaft for driving it, said gear-wheel being shiftable in its own plane, a pair of gear-wheels with either of which said first-named gear-wheel is adapted to mesh alternatively, means for driving said pair of gear-wheels from said moving-picture machine at speeds adapted to impart different velocities to said first-named gear-wheel, and means normally holding said first-named gear in mesh with one of said pair of gears.

11. The combination of a moving-picture machine and means for driving it at a predetermined speed, a phonograph having a rotatable shaft and means for driving it at a predetermined speed, and means for starting said phonograph at any desired instant comprising an electric circuit controlling said phonograph and a switch adjacent to said moving-picture machine and adapted to open and close said circuit; in conjunction with a one-way driving-mechanism between said moving-picture machine and said phonograph, said driving-mechanism being adapted to accelerate the speed of said phonograph slightly in a forward direction, and a variable speed-device in said driving-mechanism.

12. The combination of a moving-picture machine having means for operating it at a predetermined speed, a pair of phonographs having motor-devices for operating them in approximate synchrony with said moving-picture machine, each of said phonographs having a rotating-shaft, a one-way driving mechanism operated by said moving-picture machine, means for shifting said driving-mechanism, and a disengageable driving-connection between said driving-mechanism and the shaft of each phonograph, the driving-connection with one phonograph being disengaged when the other is engaged and vice versa.

13. The combination of a moving-picture machine having means for operating it at a predetermined speed, a pair of phonographs having motor-devices for operating them in approximate synchrony with said moving-picture machine, each of said phonographs having a rotating-shaft, a one-way driving-mechanism operated by said moving-picture machine, means for shifting said driving-mechanism, a disengageable driving-connection between said driving-mechanism and the shaft of each phonograph, the driving-connection with one phonograph being disengaged when the other is engaged and vice versa; said driving-mechanism containing a variable speed-device adapted to increase or diminish the speed of said driving-connections with respect to that of said moving-picture machine.

14. The combination of a moving-picture

machine having means for operating it at a predetermined speed, a pair of phonographs having motor-devices for operating them in approximate synchrony with said moving-picture machine, each of said phonographs having a rotating-shaft, a one-way driving-mechanism operated by said moving-picture machine, means for shifting said driving-mechanism, a disengageable driving-connection between said driving-mechanism and the shaft of each phonograph, the driving-connection with one phonograph being disengaged when the other is engaged and vice versa; an electromagnetic device adapted to shift said driving-mechanism, an electric circuit including said electromagnetic device, and a switch in said circuit located in proximity to said moving-picture machine.

15. The combination of a moving-picture machine having means for operating it at a predetermined speed, a pair of phonographs having motor-devices for operating them in approximate synchrony with said moving-picture machine, each of said phonographs having a rotating-shaft, a one-way driving-mechanism operated by said moving-picture machine, means for shifting said driving mechanism, a disengageable driving-connection between said driving-mechanism and the shaft of each phonograph, the driving-connection with one phonograph being disengaged when the other is engaged and vice versa; a pair of electromagnetic devices one of which is adapted to shift said driving-mechanism in one direction when energized and the other in the other direction, a pair of electric circuits including the respective electromagnetic devices, and a change-over switch adapted to simultaneously open one circuit and close the other.

16. The combination of a moving-picture machine, a variable-speed driving mechanism driven by it and means for adjusting it to two different speeds, a shaft driven by said driving-mechanism and carrying two gear-wheels, means for shifting said shaft longitudinally, a pair of phonographs each having a shaft, means for rotating the latter, a pair of gear-wheels on the respective phonograph shafts adapted to engage alternatively said first-named gear-wheels, one of said last-named gear-wheels being engaged in one position and the other in an-

other position of said shaft, and means for shifting said shaft and normally inoperative means operable to give a slight acceleration to the phonograph whenever it would otherwise retard behind synchrony.

17. The combination of a moving-picture machine, a variable-speed driving-mechanism driven by it and means for adjusting it to two different speeds, a shaft driven by said driving-mechanism and carrying two gear-wheels, means for shifting said shaft longitudinally, a pair of phonographs each having a shaft, means for rotating the latter, a pair of gear-wheels on the respective phonograph shafts adapted to engage alternatively said first-named gear-wheels, one of said last-named gear-wheels being engaged in one position and the other in another position of said shaft, an electromagnetic device adapted to shift said shaft, an electric circuit including said device, normally inoperative means operable to give a slight acceleration to the phonograph whenever it would otherwise retard behind synchrony, and a switch in proximity to said moving-picture machine in said electric circuit.

18. The combination of a moving-picture machine, a variable-speed driving-mechanism driven by it and means for adjusting it to two different speeds, a shaft driven by said driving-mechanism and carrying two gear-wheels, means for shifting said shaft longitudinally, a pair of phonographs each having a shaft, means for rotating the latter, a pair of gear-wheels loosely mounted on the respective phonograph shafts adapted to engage alternatively said first-named gear-wheels, one of said last-named gear-wheels being engaged in one position and the other in another position of said shaft, and means for shifting said shaft; each of said gear-wheels on the respective phonograph-shafts having a one-way driving-connection therewith adapted to accelerate the driving-shaft in the direction of its rotation when the gear-wheel turns faster than the shaft but permitting the shaft to turn faster than the gear-wheel.

In witness whereof, I have hereunto set my hand in the presence of two witnesses.

J. B. OLINGER.

Witnesses:

ROBERT WHITE,
PAUL BEFFORT.

LOCKING DEVICE FOR SPEED GOVERNORS
OF TALKING MACHINES,
#1,186,638-----C. E. Woods,
Patented-June 13th, 1916.
Filed-March 5th, 1914.

LOCKING DEVICE FOR SPEED GOVERNORS OF TALKING MACHINES.

1,186,638.

Fig. 1.

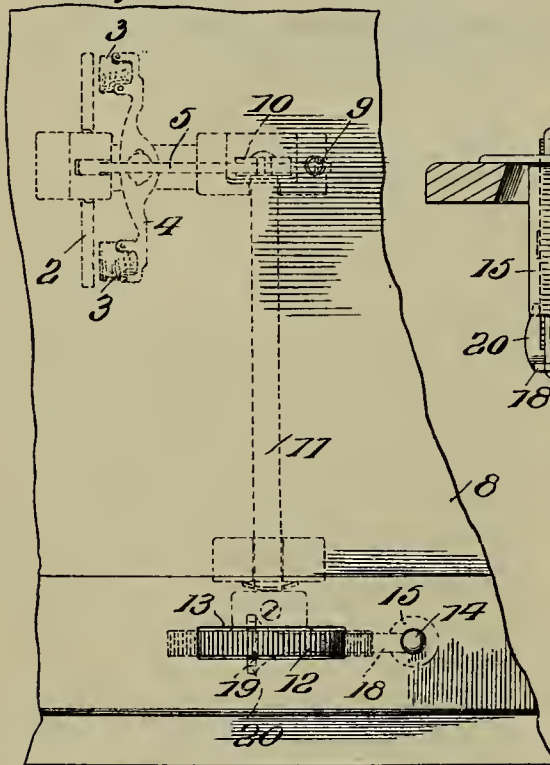


Fig. 2.

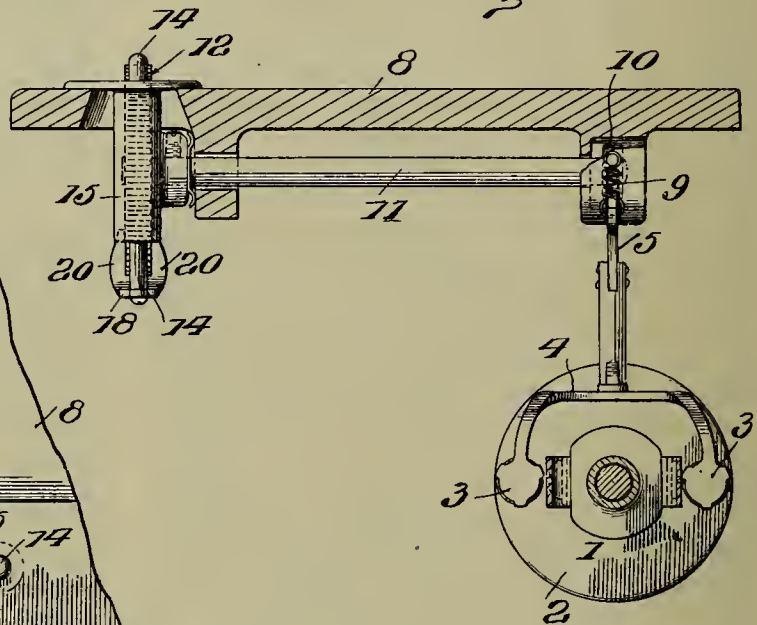


Fig. 3.

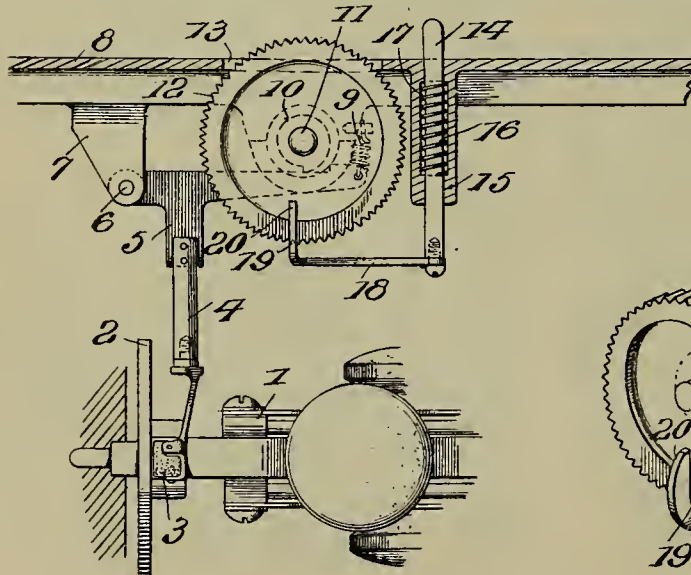
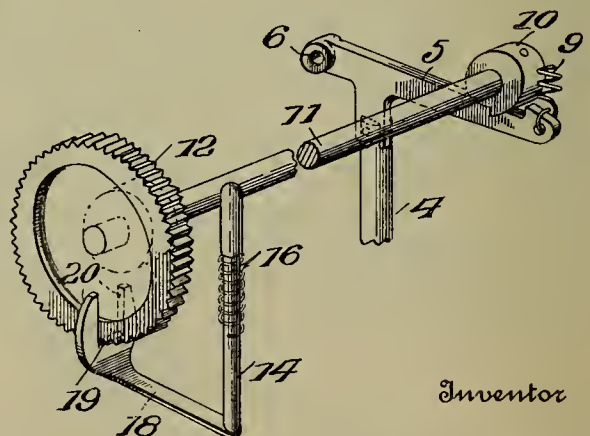


Fig. 4.



Witnesses
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UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

LOCKING DEVICE FOR SPEED-GOVERNORS OF TALKING-MACHINES.

1,186,638.

Specification of Letters Patent.

Patented June 13, 1916.

Application filed March 5, 1914. Serial No. 822,687.

To all whom it may concern:

Be it known that I, CLINTON E. WOODS, of Bridgeport, Connecticut, have invented a new and useful Improvement in Locking
5 Devices for Speed-Governors of Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to speed governors for talking machines, and more particularly
10 to means for locking the adjusting mechanism of such speed governors in any given adjusted position, to the end that when the machine has been adjusted to the desired speed, it may not be inadvertently or acci-
15 dentally disturbed.

In talking machines, in order to secure the best results either in recording or reproducing, it is desirable that the record tablet should be driven at approximately a pre-
20 determined speed, and for this purpose means, in the form of a speed governor, are provided for controlling the speed of the motor, which governing mechanism is adjusted through an element or elements for
25 varying the position of the friction pads which coöperate with the friction disk of the speed governor. In certain classes of machines such, for example, as those used for office dictating purposes, it is desirable that
30 the speed at which the record is driven in reproducing should be the same, or approximately the same, as the speed at which the record was driven in dictating. And it is a common practice to adjust the speeds of
35 the dictating machine and the reproducing machine so that they are approximately the same. This adjustment having been secured, it is desirable that it should be maintained against disturbance. In the present inven-
40 tion, this object is secured by providing means for locking the element through which adjustment is obtained against accidental displacement, and until the locking device is manipulated to free the adjusting
45 element.

The invention will be best understood from the detailed description and drawings thereof.

The inventive idea may receive a variety
50 of mechanical expressions, one of which is shown in such drawings and specifically described herein, but such drawings and de-

scription are for the purpose of enabling the invention to be understood, and are not meant to define the limits thereof, reference
55 being had to the appended claims for this purpose.

In said drawings—Figure 1 is a top plan view showing a portion of the bed-plate of the machine; Fig. 2 is an elevation of Fig. 60
1 looking from the right; Fig. 3 is an elevation of Fig. 2 looking from the left; and Fig. 4 is a detailed perspective.

Referring to the said drawings, in which like reference numerals indicate like parts
65 throughout the several views, 1 is a speed governor of any suitable or desired construction, and 2 is the friction disk thereof, in operative relation with friction pads 3 carried on a fork 4 suspended from a lever 5
70 fulcrumed at 6 to an ear 7, depending from the bed-plate 8 of the talking machine. The lever 5 is normally held in its elevated position by a spring 9 and in operative engagement with an element for depressing the
75 lever 5, and thereby throwing the pads 3 toward the friction disk 2. As herein shown, this element is in the form of a gradually increasing cam 10, mounted on a shaft 11
80 turning in suitable bearings depending from the bed-plate 8 of the machine. On the end of the shaft 11 is a toothed or serrated wheel 12, of such diameter that it projects through an opening or slot 13 formed in the bed-plate 8, so that the serrated edge of the wheel 12
85 projects slightly above the surface of the bed-plate, as will be readily understood from an inspection of Fig. 3. This serrated wheel is technically known in the art as the "speed knob", and the operator of the machine, by
90 turning this wheel, increases or decreases the action of the cam 10 upon the lever 5, and thus varies the relation of the friction pads 3 with the disk 2.

A pin or rod 14 is mounted in a tubular
95 socket or bearing 15 depending from the bed-plate 8, and is surrounded by a spring 16 reacting against a shoulder 17 on the pin and the bottom of the socket 15, and tending normally to hold the pin 14 with its
100 upper end projecting above the surface of the bed-plate 8, as is clearly shown in Fig. 3. On the lower end of the pin 14 is an arm 18 rigidly secured thereto and projecting

under the speed knob 12, and carrying at its end a tooth 19 (Fig. 4) for engaging the teeth or serrations on the speed knob 12. Preferably, the arm 18 is forked, as shown in Fig. 4, the tines or arms 20 of the fork straddling the speed knob, and with the tooth 19 between them.

Operation: When the operator desires to adjust the machine so as to drive the record at the desired speed, he depresses the rod 14 against the tension of the spring 16, thereby disengaging the tooth 19 from the teeth or serrations on the speed knob 12, and then revolves the speed knob, and with it the cam 10, until the desired speed is secured. He then removes pressure from the pin 14, and the spring 16 elevates the same, and with it the arm 18, bringing the tooth 19 thereon into engagement with the speed knob, and locking it against accidental displacement.

If desired, the relations between the tooth 19 on the arm 18 and the teeth or serrations on the speed knob 12 may be such that the speed knob may be adjusted without manipulation of the pin 14, but only by the exercise of sufficient power to overcome the tension of the spring 16. In either event, the speed knob is held against accidental displacement, and the objects of the invention are secured.

Various modifications of the specific construction herein shown may be made, without departing from the spirit of the invention, the essential feature of which is the provision of means for locking the adjusting mechanism against accidental displacement, which means may be readily manipulated by the operator for releasing the adjusting mechanism when it is desired to vary the speed of the record tablet.

What is claimed is:—

1. In a talking machine, the combination of a horizontal motor-board having a slot therein, a speed governor, controlling means for the governor comprising a vertical adjusting wheel mounted to project upward through the said slot to permit manual adjustment thereof, and means below the motor-board for yieldably engaging the wheel to hold it in adjusted position.

2. In a talking machine, the combination of a horizontal motor-board having a slot therein, a speed governor, controlling means for the governor comprising a vertical adjusting wheel mounted to project upward through the said slot to permit manual adjustment thereof, and manually operable means for engaging the wheel below the motor-board for engaging the wheel to hold it in adjusted position.

3. In a talking machine, the combination of a motor-board having a slot therein and having an aperture adjacent the slot, a speed governor, controlling means for the governor comprising an adjusting wheel mounted to project upward through the said slot,

means below the motor-board for engaging the wheel to hold it in adjusted position, and a manually operable device projecting upward through the aperture and connected with the holding means to bring the latter into and out of operation.

4. In a talking machine, the combination of a motor-board having a slot therein and having an aperture adjacent the slot, a speed governor, controlling means for the governor comprising an adjusting wheel mounted to project upward through the said slot, means below the motor-board for engaging the wheel to hold it in adjusted position, a manually operable pin projecting upward through the aperture and connected with the holding means, and a spring for moving the pin upward and to bring the holding means into operative position.

5. In a talking machine, the combination of a horizontal motor-board having a slot therein, a speed governor, controlling means for the governor comprising a vertical adjusting wheel serrated along its entire circumference and mounted to project upward through the said slot to permit manual adjustment thereof, and toothed means below the motor-board for engaging the serrations of the wheel to hold it in adjusted position.

6. In a talking machine, the combination of a speed governor, controlling means for the governor comprising an adjusting wheel serrated along its entire circumference and having its serrations exposed at one side for manual engagement, and toothed means for engaging the serrations of the wheel at a point remote from the place of manual engagement to hold the wheel in adjusted position.

7. In a talking machine, the combination of a speed governor, means for controlling the governor comprising a serrated wheel, a rectilinearly movable pin adjacent the wheel, a tooth carried by the pin and adapted for normally engaging said toothed wheel when the wheel is in any of several positions of adjustment, and a spring tending to hold the pin and the tooth in the position in which the latter engages the wheel.

8. In a talking machine, the combination of a speed governor, means for controlling the governor comprising a serrated wheel, a rectilinearly movable pin adjacent the wheel, a finger connected to the pin and extending at an angle thereto, a tooth at the end of the finger adapted for normally engaging said toothed wheel when the wheel is in any of several positions of adjustment, and a spring tending to hold the pin, the finger and the tooth in the position in which the latter engages the wheel.

9. In a talking machine, the combination of a speed governor, means for controlling the governor comprising a serrated wheel, a rectilinearly movable pin adjacent the

wheel, a finger connected to the pin and extending at an angle thereto, a tooth at the end of the finger adapted for normally engaging said toothed wheel when the wheel
5 is in any of several positions of adjustment, tines at the end of the finger extending on opposite sides of the wheel to prevent lateral movement of the finger, and a spring tending to hold the pin, the finger and the tooth

in the position in which the latter engages 10 the wheel.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN S. GRIFFITH,

JOHN R. PETRIE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

At 10:00 AM, the ship departed from the harbor. The weather was clear and the sea was calm. The crew was in high spirits and the passengers were comfortable. The ship sailed smoothly and the captain was in command. The ship arrived at the destination at 12:00 PM. The crew and passengers were all well and the ship was in good condition. The captain was very satisfied with the trip and the crew was very happy to be home. The passengers were all safe and sound and the ship was in good condition. The captain was very satisfied with the trip and the crew was very happy to be home. The passengers were all safe and sound and the ship was in good condition.

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VOICE RECORDING AND REPRODUCING
DEVICE,

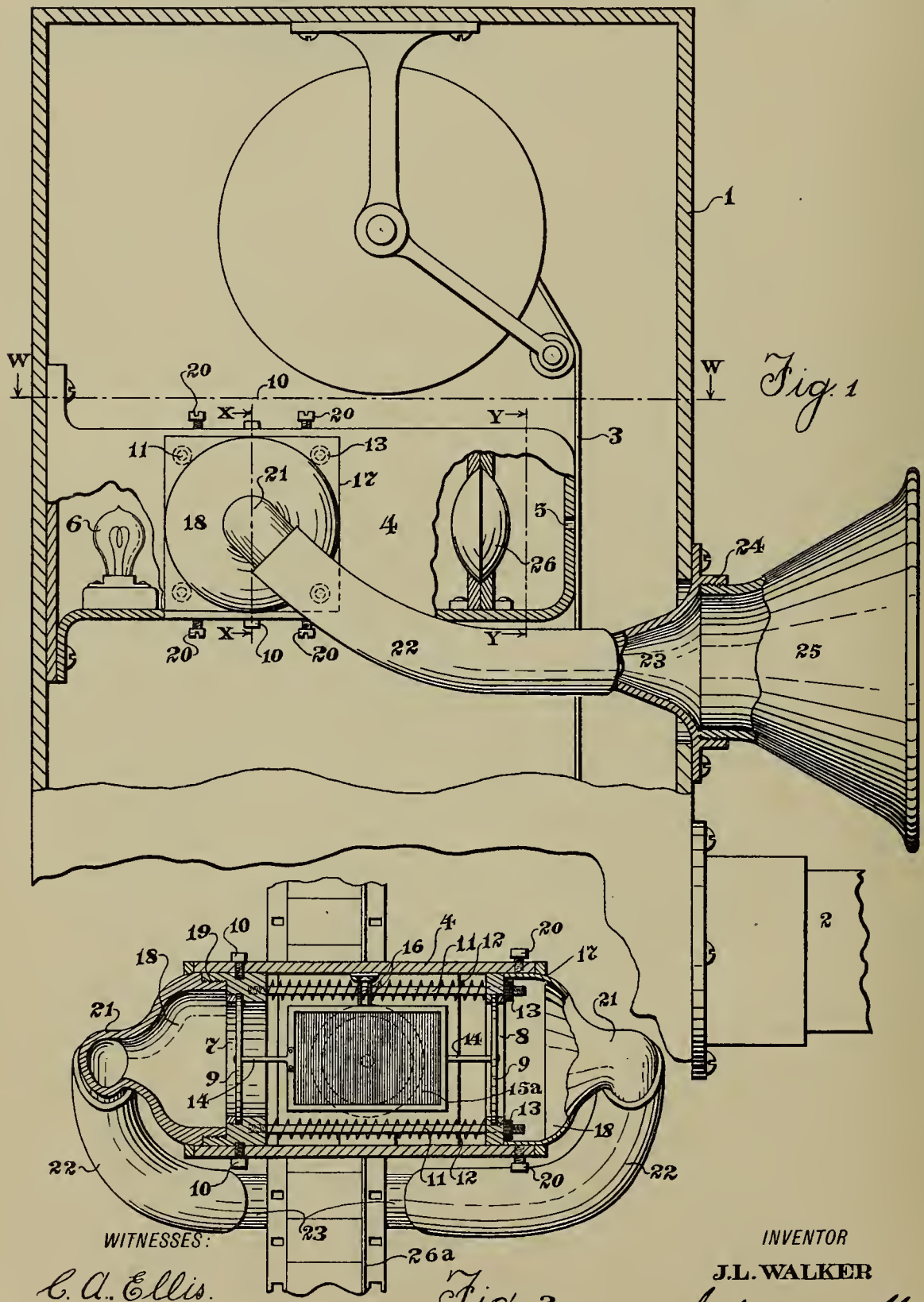
#1,186,717-----J. L. Walker,
Patented-June 13th, 1916.
Filed-September 2nd, 1913.

J. L. WALKER.
VOICE RECORDING AND REPRODUCING DEVICE.
APPLICATION FILED SEPT. 2, 1913.

1,186,717.

Patented June 13, 1916.

5 SHEETS—SHEET 1.



WITNESSES:
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Fig. 3.

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1,186,717.

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5 SHEETS—SHEET 2.

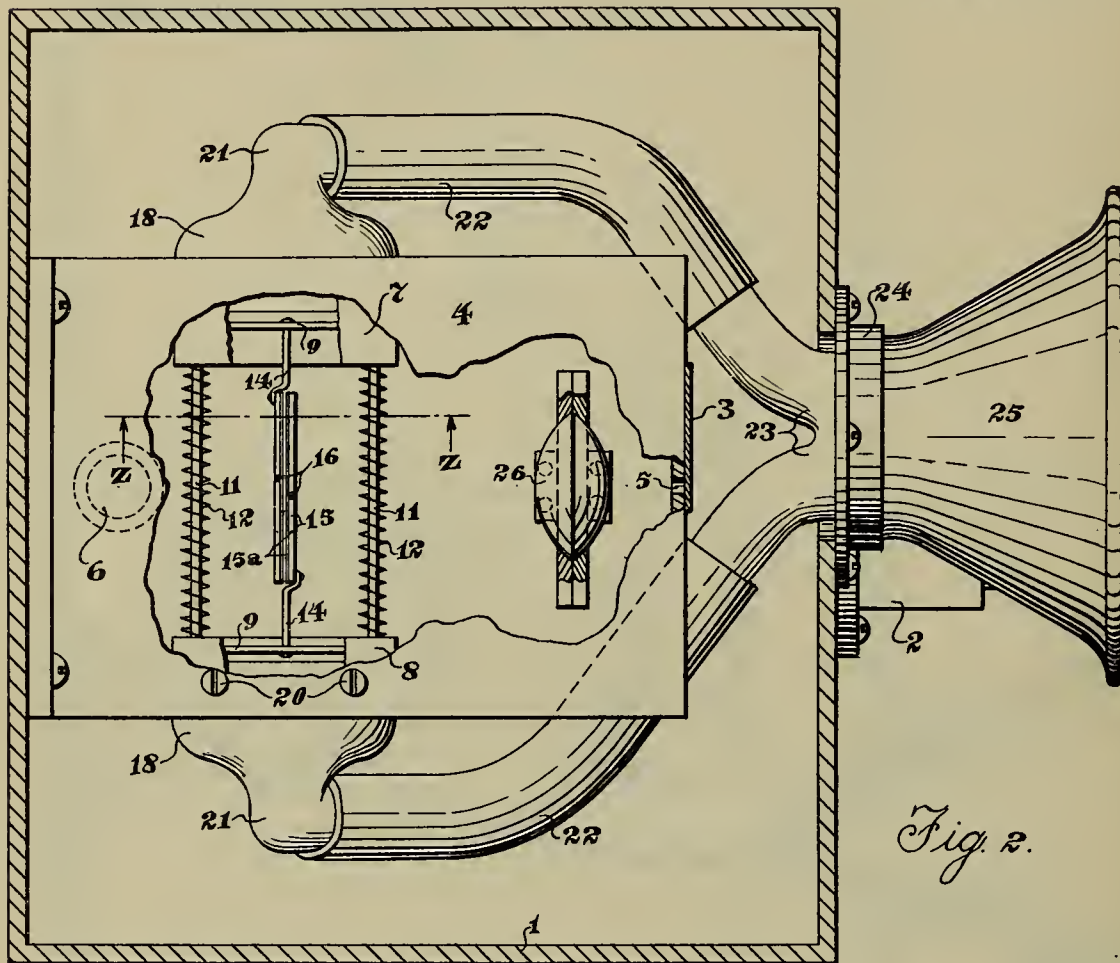


Fig. 2.

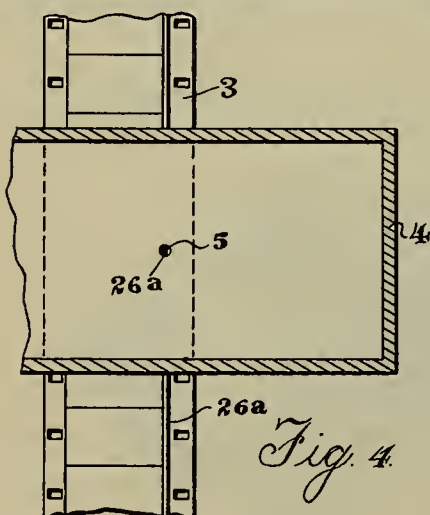


Fig. 4.

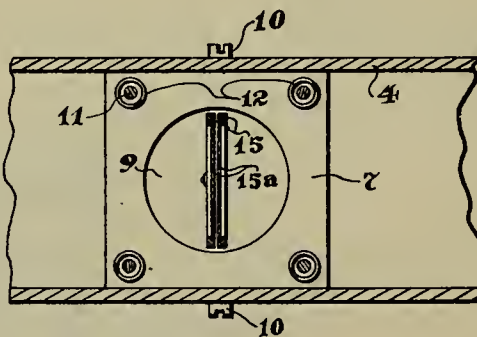


Fig. 5.

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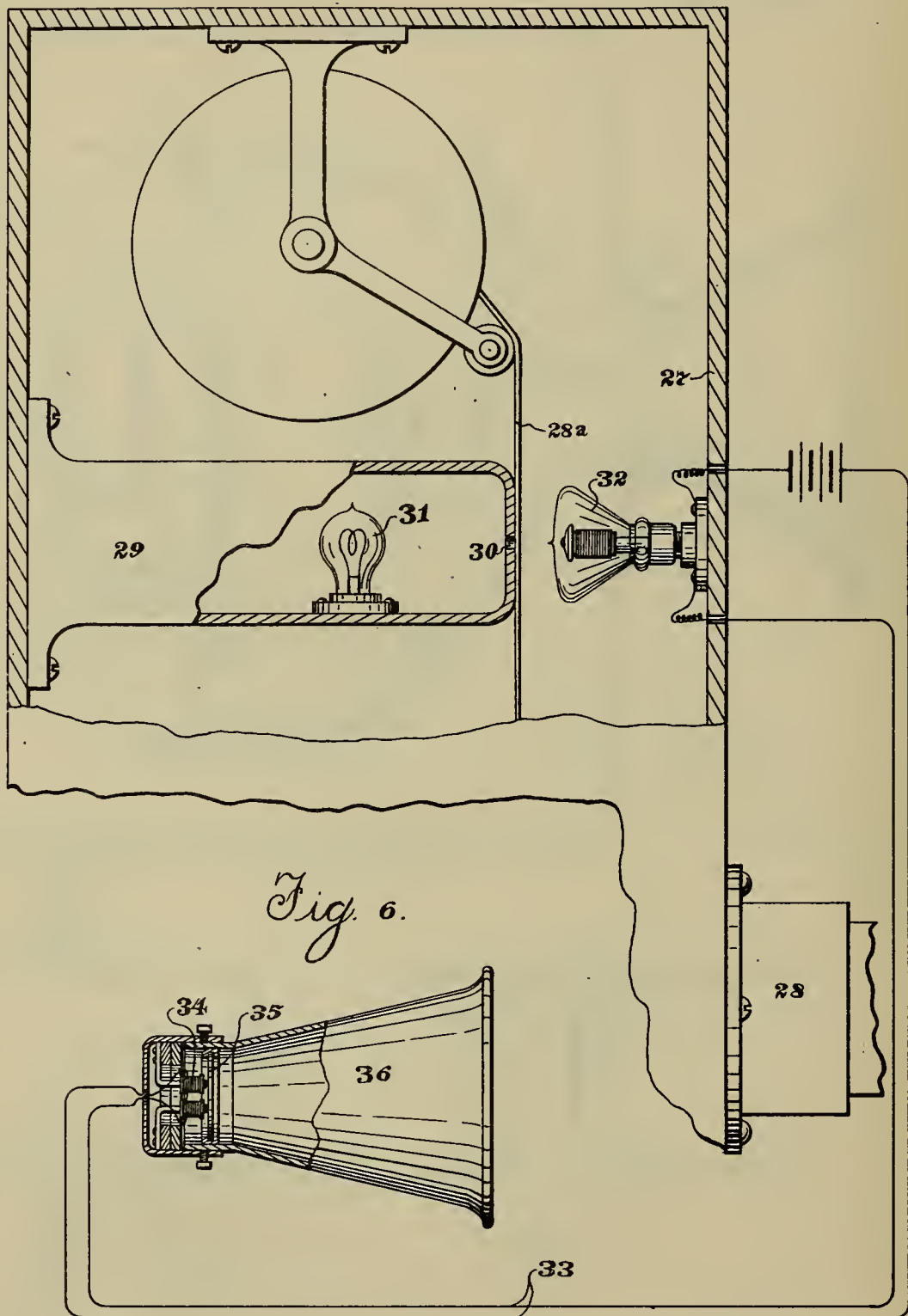


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APPLICATION FILED SEPT. 2, 1913.

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APPLICATION FILED SEPT. 2, 1913.

1,186,717.

Patented June 13, 1916.
5 SHEETS—SHEET 4.

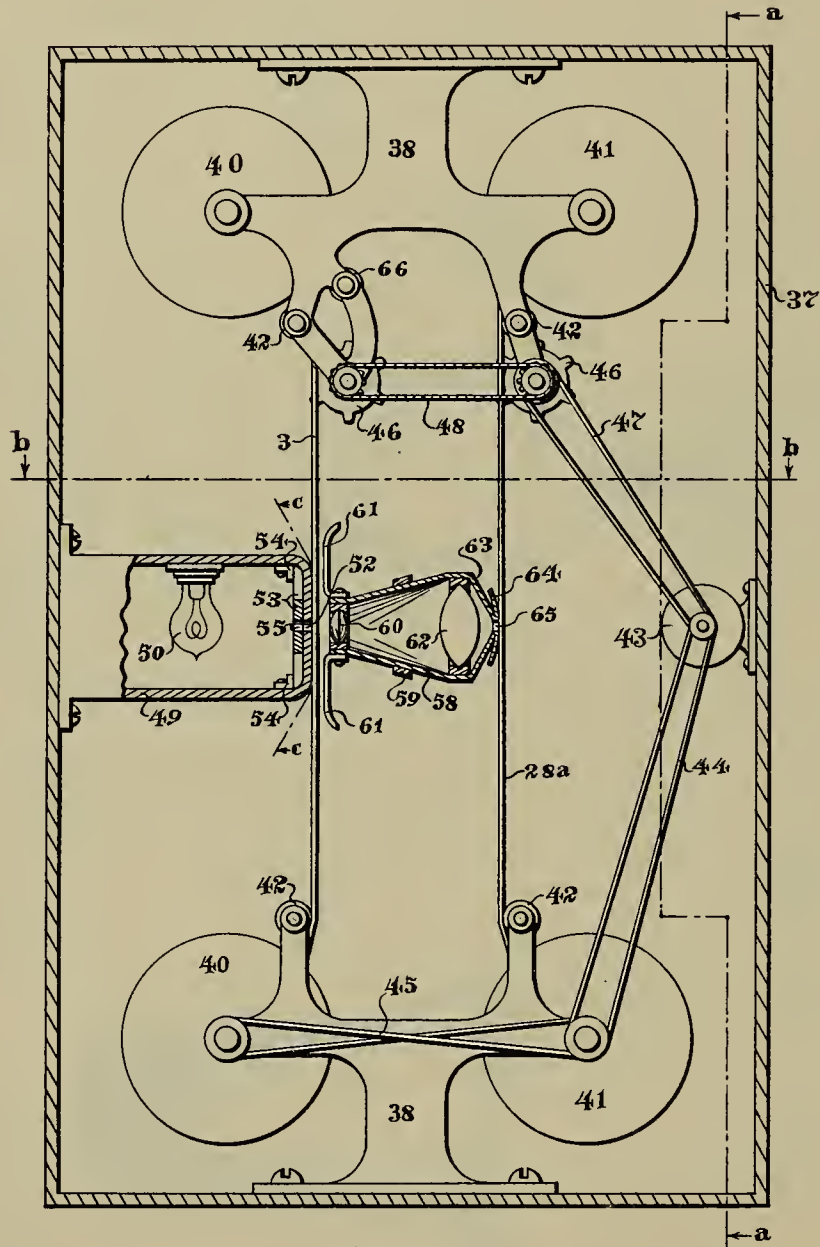


Fig. 2.

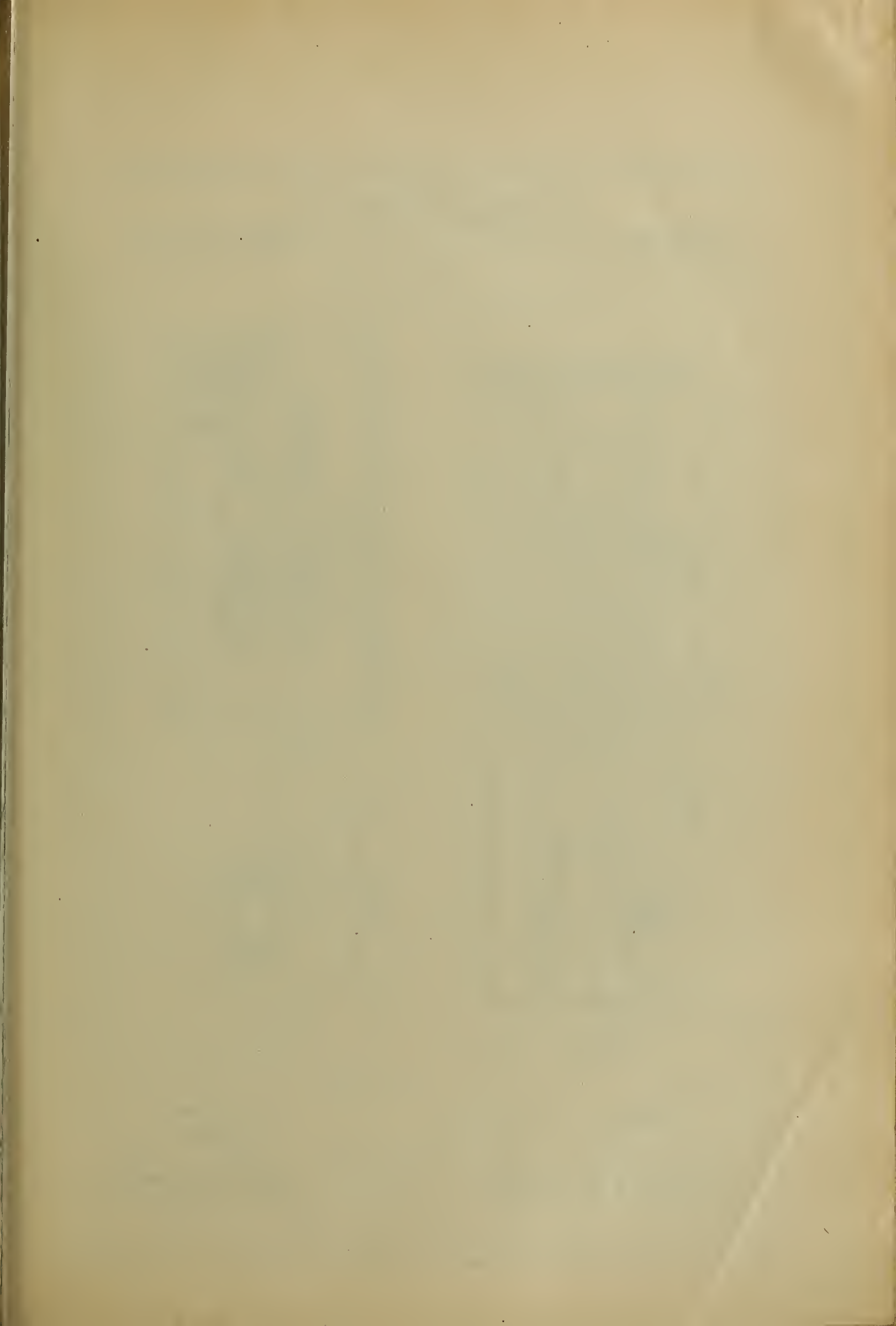
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APPLICATION FILED SEPT. 2, 1913.

1,186,717.

Patented June 13, 1916.
5 SHEETS—SHEET 5.

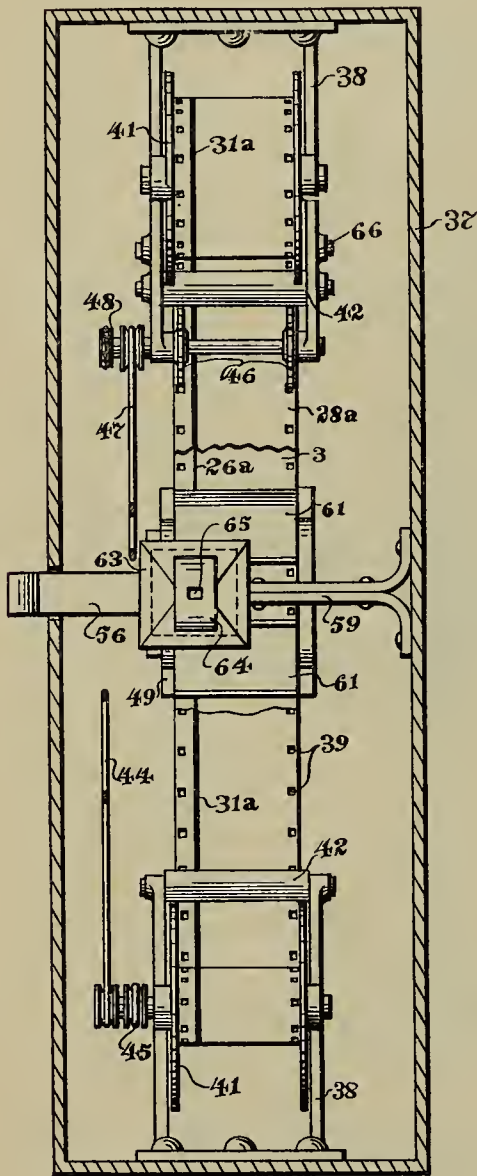


Fig. 8.

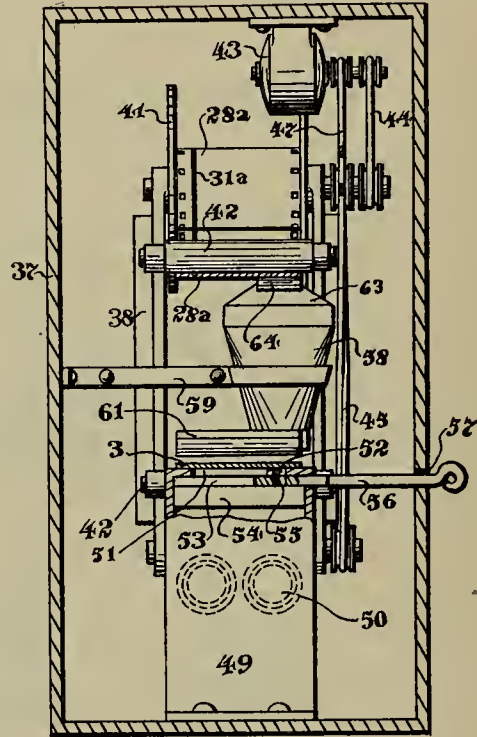


Fig. 9.

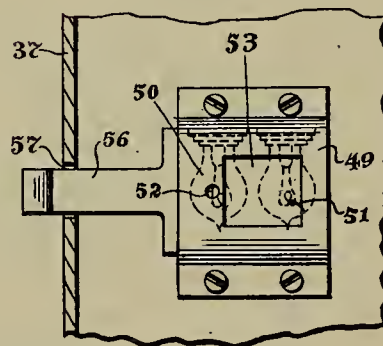


Fig. 10.

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INVENTOR

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UNITED STATES PATENT OFFICE.

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VOICE RECORDING AND REPRODUCING DEVICE.

1,186,717.

Specification of Letters Patent.

Patented June 13, 1916.

Application filed September 2, 1913. Serial No. 787,682.

To all whom it may concern:

Be it known that I, JACK L. WALKER, a citizen of the United States, residing at Dallas, in the county of Dallas and State of Texas, have invented certain new and useful Improvements in Voice Recording and Reproducing Devices, of which the following is a specification.

My invention relates to a new and useful sound recording and reproducing device. Its object is to provide an attachment for a moving picture camera, which, while a picture is being taken, will produce upon the film receiving the picture a continuous photographic record of sounds that appropriately accompany the picture.

Another object is to provide an apparatus that will cause a certain quantity of light to vary in intensity proportionately with sound vibrations of air, so that by focusing the light upon a strip of moving film, a photographic record of the sounds may be produced.

A further object is to provide an attachment for a moving picture projecting machine, which, when a strip of film carrying a photographic sound record is traveling before the projecting lens, will reproduce from the film the sounds recorded thereupon, the projecting pictures and reproduced sounds being synchronous.

A still further object is to provide a means for reproducing sound from a photographic record carried by a film by maintaining travel of the film and focusing light through its record-carrying portion upon a selenium cell, contained in an electrical circuit with an electro-magnetic sound reproducer, causing the resistance of the circuit to vary proportionately as the record on the film varies in transparency.

Still another object is to provide a means by which a continuous sound record photographically produced upon a negative film may be accurately reproduced upon a positive film in an enlarged size.

Finally, the object of my invention is to provide a device of the character described, that will be strong, durable, simple and efficient and comparatively easy to construct.

With these and various other objects in view, my invention has relation to certain novel features of construction and operation, an example of which is described in the fol-

lowing specification, and illustrated in the accompanying drawings, wherein:

Figure 1 is a view, showing in side elevation, my attachment for a moving picture camera, together with certain interior portions of the camera. Fig. 2 is a horizontal sectional view of the same, the section being taken upon the line W—W of Fig. 1. Fig. 3 is a detail sectional view taken upon X—X of Fig. 1. Fig. 4 is a detail sectional view taken upon the line Y—Y of Fig. 1. Fig. 5 is a detail sectional view taken upon the line Z—Z of Fig. 2. Fig. 6 is a view, showing in side elevation my attachment for a moving picture projecting machine, together with certain interior portions of the machine, this view being also made to include an electro-magnetic sound reproducer which is shown diagrammatically connected with the projecting machine by an electrical circuit. Fig. 7 is a view showing in side elevation my machine for transferring an enlarged sound record from the negative to a positive film, the casing of the machine being shown in section. Fig. 8 is a vertical sectional view of the same taken upon the line a—a of Fig. 7. Fig. 9 is a detail horizontal sectional view taken upon the line b—b of Fig. 7. Fig. 10 is a detail vertical sectional view taken upon the line c—c of Fig. 7.

Referring now more particularly to the drawings, wherein like reference characters designate similar parts in all the figures, the numeral 1 denotes the casing of a moving picture camera, having the usual lens holder 2, opposite to which a strip of film 3 is adapted to travel within the camera.

The particular manner of supporting the film and actuating its travel is old and therefore requires no description or illustration in connection with my device.

At an elevation above the lens holder 2, the film 3 has contact with the front end of a rectangular box 4 impervious to light mounted upon the rear wall of the casing, the front wall of said box being formed with a pin hole aperture 5, opposite to one of the edge portions of the film. In the rear portion of the box 4, there is mounted an incandescent electric bulb 6, which may derive current from any suitable source. In the middle portion of the box 4, a pair of rectangular frames 7 and 8 are mounted

oppositely and respectively adjacent to the side walls of the box, said frames serving to mount similar circular diaphragms 9. The frame 7 is permanently engaged in a rigid
 5 relation with the box 4 by two cap screws 10, one of which enters said frame through the top of the box and one through the bottom thereof. The two frames 7 and 8 are connected at their corners by four elongated
 10 horizontal bolts 11, mounted fast in the frame 7, but passing freely through the frame 8. Upon each bolt 11, there is mounted a coiled spring 12 having its extremities respectively abutting against the
 15 two frames, serving to hold the frame 8, firmly pressed against adjusting thumb-nuts 13 mounted upon the free ends of the bolts 11. By means of said thumb-nuts, the frame 8 may be subjected to a delicate adjustment to or from the frame 7. To the
 20 centers of the diaphragms 9, there are secured short horizontally alined wires 14, which are respectively connected with two rectangular frames 15 containing sheets of
 25 mica or some similar transparent substance, indicated by the numeral 15^a. Said sheets of mica are suspended vertically and transversely of the box 4 by threads 16, attached to the top of said box, midway between its
 30 side walls and centrally secured to the upper edges of the members 15. The threads 16 and wires 14 together hold the members 15^a in a slightly spaced relation. Upon each of the members 15^a, there are provided a plurality of very closely adjacent vertical lines
 35 of a black or other opaque color. The side walls of the box 4 are formed opposite to the diaphragms 9 with rectangular apertures 17, into each of which there is fitted
 40 a metallic sound transmitter 18, one of which has a screw-threaded connection with the frame 7 as indicated at 19, while the other is held in place by set-screws 20, passing respectively through the top and bottom
 45 walls of the box 4. The transmitters 18 are formed with integral elbows 21, which respectively communicate with tubes 22, (preferably flexible) extending toward the front of the casing 1, above the lens holder
 50 2, and communicating with a member 23 mounted in the front casing wall. The member 23 is formed with an annular threaded flange 24, receiving a member 25 having the form of an ordinary telephone
 55 mouth-piece.

In the front portion of the box 4, there is mounted a lens 26, so disposed that such light from the lamp 6 as reaches said lens through the members 15 will be focused
 60 through the aperture 5 upon an edge portion of the film 3, forming a line 26^a thereupon.

An explanation will now be given as to the operation of the above described attachment to a moving picture camera. While
 65 a picture is being taken, the lamp 6 is kept

lighted, and the travel of the film is maintained in the usual manner. The air vibrations created by the various sounds accompanying the picture, are conducted by a mouth-piece 25 and the tubes 22 to the
 70 diaphragms 9 causing the same to vibrate in synchronism with the air vibrations. From the diaphragms 9, these same vibrations are communicated to the members 15^a, the vibrating motion of said members being parallel and opposite. When the members 15^a
 75 are at rest, the vertical lines provided upon one of said members will be opposite to the spaces between the lines provided upon the other member so that a negligible quantity of light from the lamp 6 will pass through the two members. But when the two members are in vibratory motion, the relation between the lines formed upon the two members will be constantly varying, the magnitude of this variation being proportionate to the magnitude of the air vibrations. While the members 15^a are in vibration, therefore, a constantly varying quantity of light emitted by the lamp 6 will pass
 80 through the members 15^a, the intensity of this light, varying in unison with the intensity of the vibratory force acting upon the members 15^a. A certain quantity of the light thus passing through the members 15^a
 85 will pass also through the lens 26 which will focus this light upon the moving film 3 through the aperture 5, thus producing upon the sensitized surface of the film the line 26^a parallel and adjacent to one of the film
 90 edges. This line will vary in transparency according as the light which produced it varied in intensity, and hence will be an accurate photographic record of the sounds produced in the vicinity of the camera during
 95 the taking of a moving picture, each sound being recorded adjacent to the pictures taken while the sound was being produced.

A description will now be given of an attachment to a moving picture projecting
 100 machine, which attachment serves to reproduce the sounds recorded upon a film in the manner set forth in the preceding description. The casing 27 of the projecting machine is provided with the usual lens holder
 105 28, opposite to which a film 28^a is adapted to travel vertically within said casing. The means for supporting the film within said casing and for actuating its travel are not new and require no description or illustration herein. A rectangular box 29 is mounted within the casing 1 upon the rear wall thereof in substantially the same relation to the member 28 and to the film 28^a as has been already described in connection with
 110 the moving picture camera attachment. In the front of the box 29 is formed a pin-hole aperture 30, through which light from an incandescent bulb 31 within the box may reach and pass through a record line 31^a
 115 120 125 130

carried by an edge portion of the strip 28^a. The record line 31^a carried by the film 28^a has precisely the same variations in transparency as that produced upon the film 3, but has a greater width. The means for producing the line 31^a are hereinafter described. Directly opposite to the aperture 30, a selenium cell 32 is mounted upon the front wall of the casing, said cell being contained in a circuit 33 in which are also included the coils 34 of a powerful sound transmitter, the diaphragm of which is indicated at 35 and the sound amplifying horn at 36. Any suitable source of electromotive force may be included in the circuit 33.

In the operation of my attachment to a motion picture projecting machine the light 31 will be maintained constantly lighted while the film 28^a is in motion. The rays from the lamp 31 passing through the aperture 30 and through the record line 31^a upon the film will impinge upon the selenium cell 32, with an intensity varying as the transparency of the record varies. This will cause the resistance of the circuit 33 to vary in synchronism with the variations in transparency of the sound record so that the resulting vibrations of the diaphragm 35 will reproduce the sounds recorded upon the film. Since the sounds recorded upon the film are reproduced simultaneously with the projection of pictures made during the production of the sounds, the projection of the pictures upon the film will be synchronous with the sound reproduction. That this synchronism may be perfect, the rays of light should pass through the record line 31^a at the same distance above the lens-holder as in the moving picture camera attachment.

A description will now be given of a machine which is employed to produce upon a positive film 28^a an enlarged reproduction of the sound-record line 26^a formed as previously described upon a negative film. Within a casing 37, upon the top and bottom thereof, there are respectively mounted pairs of brackets 38, each pair of brackets serving to rotatably support a pair of horizontally alined film reels 40 and 41. The reels 40 and the reels 41 are respectively vertically alined. The upper reel 40 when mounted in its correlated brackets carries a negative film 3, which film is vertically extended to the lower reel 40 upon which it is adapted to be wound. The upper reel 41 when placed in its correlated bracket carries a positive film 28^a which is extended vertically to the lower reel 41 upon which it is adapted to be wound. The vertical portions of the two films 3 and 28^a have a parallel spaced relation. Each pair of brackets 38 carries a pair of guide rollers 42, which serve to hold the vertical portions of the two films constantly spaced the same distance during their travel.

The two films are adapted to travel downwardly at exactly the same rate of speed, their travel being induced by a small electric motor 43 driving the lower reel 41 through a belt 44. The lower reel 41 drives the lower reel 40 through a crossed belt 45. The lowermost reels 40 and 41 are driven, not to actuate the travel of the films, but to take up the slack of the films as they are driven downwardly. The mechanism for driving the films comprises two pairs of star wheels 46 mounted in the upper pair of brackets 38, engaging the lines of perforation 39 carried by the edge portions of the two films. The star wheels driving the film 28^a are driven from the motor 43 through a belt 47, and the other pair of star wheels is driven by a sprocket chain 48 carried by sprocket wheels mounted upon the spindles of the star wheels.

The vertical portion of the film 3 is contiguous with one end of a closed box 49, containing a lamp or a plurality of lamps 50, the other end of which box is mounted fast upon the casing 37. That end of the box 49 with which the film 3 is contiguous, is formed with a rectangular opening 51, having its vertical edges alined with the vertical edges of the picture carrying portion of the film, and having a height equal to one of the pictures carried by the film 3. In the same wall of the box 49, there is formed a pin hole aperture 52 which is alined with the record line 26^a. Within the box 49, there is mounted a shutter 53 which is held contiguous with the apertured end of said box by angular strips 54 respectively secured to the top and bottom of said box. The shutter 53 is imperforate except for the pin hole aperture 55, which in one limiting position of the shutter is alined with the aperture 52. In the same limiting position of the shutter, it completely covers the rectangular aperture 51, preventing any light escaping from the box 49 except through the pin-hole apertures 55 and 52. In the other limiting position of said shutter, the same is shifted to a large extent out of the box 49 uncovering the rectangular aperture 51 and covering the pin-hole aperture 52. The means for shifting the shutter 53 between its limiting positions comprises a handle member 56 integrally formed with the shutter and passing through an aperture 57 in the casing 37.

Between the vertical portions of the films 3 and 28^a, there is mounted a funnel-shaped casing 58 having its center line transverse of the films and passing through the aperture 52. The member 58 is supported rigidly by a bracket 59 secured to one of the walls of the casing 37. In the small end of the member 58, which end is closely adjacent to the box 49, there is secured a pair of guide plates 61 respectively extending upwardly

and downwardly, and curved at their free extremities slightly away from the adjacent film, guiding the same between said plates and the box 49. Within the small end of the casing 58, is centrally mounted a double convex lens 60, which will transmit any rays of light passing through the apertures 55 and 52 and through the film and will conduct said rays divergently to a larger cylinder lens 62 mounted in the large end of the member 58. The lens 62 will converge the rays of light passing through it, focusing them in a small rectangle upon an edge portion of the film 28^a. To prevent any diffusion of these rays such as might cause some of them to impinge upon the central portion of the film 28^a, the large end of the casing 58 is inclosed as indicated at 63, the member 63 being formed with a slit 65 through which the rays are projected upon the film 28^a. Above and below the slit 65, curved guide plates 64 may be secured to the member 63 to steady the film 28^a during its vertical travel.

An explanation will now be given as to the operation of the device which has just been described. The object of this device is to reproduce the record line carried by the negative film 3 in an enlarged size upon the positive film 28^a, so that when the positive film is passed through a projecting machine carrying my sound reproducing attachment, a larger quantity of light may be made to vary in intensity synchronously with a certain succession of sounds, so that the fluctuations in the resistance of the selenium cell previously mentioned may be more pronounced. During the process of enlarging the record line, the films 3 and 28^a will travel at a much slower rate than when said films are traveling either in the motion picture camera or projecting machine. Hence, in the enlarging machine, a much greater quantity of light will pass through every portion of the record line 26^a and will be focused in the form of a small rectangle upon the edge portion of the film 28^a. This light, in passing through the record line of the film 3 will vary in intensity according as said record line varies in transparency, and this light being focused upon the film 28^a will produce thereupon a record line 31^a varying in transparency uniformly with the record line 26^a. The enlargement of the line produced upon the film 28^a is due to the use of the concentrating cylinder lens 62.

The machine which has just been described may be employed also to print positively upon the film 28^a, the pictures negatively carried by the film 3. In using the machine for this purpose, the positive and negative films will be carried as before, re-

spectively by the two upper reels 40 and 41. In this case, however, the positive film instead of passing vertically to the lower reel 41, will be extended over a roller 66 carried by the uppermost pair of brackets 38 and will then be extended downwardly contiguously with the film 3 passing with said film between the box 49 and the plates 61. After passing below the lower plate 61, the film 28^a will be extended to the lower reel 41 upon which it will be wound. The star wheels 46 engaging the apertures 39 of the film 3 will also engage the same apertures in the film 28^a, so that the one pair of star wheels will actuate the travel downwardly of the two films. The shutter 53 will now be shifted outwardly so as to leave the rectangular aperture 51 unobstructed allowing the light from the lamp 50 to pass through said aperture 51 and through the two films, the two films being actuated downwardly. The light passing through the film 3 will produce upon the sensitized face of the film 28^a positive reproductions of the negative pictures carried by the film 3.

In Figs. 9 and 10 the box 49 contains two lamps 50 of which the left hand lamp is used to reproduce the picture, when light from the other lamp is shut off by shutter 56. The right hand lamp is used, when the left hand lamp is shut off, in the reproduction of the magnified voice record.

The invention is presented as including all such modifications and changes as properly come within the scope of the following claim.

What I claim is:

In a device of the character described, the combination with an elongated strip of sensitized film, of means for inducing longitudinal travel of said strip, means for projecting light upon a portion of the film during its travel, a plurality of adjacent members interposed between the source of said light and the film, said members having alternate transparent and opaque portions of very small area, means for adjusting said members parallel to each other, vibratory diaphragms correlated with said members, and communicating their vibrations to the same, the joint transparency of said members being varied proportionately to the intensity of the vibrations communicated to the same, and means for conducting sound vibrations of air to said diaphragms.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JACK L. WALKER.

Witnesses:

J. S. MURRAY,
MAYBELLE REAVES.

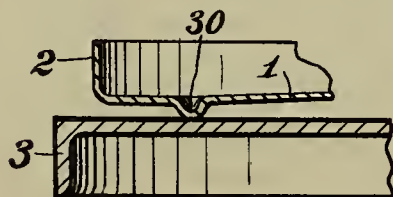
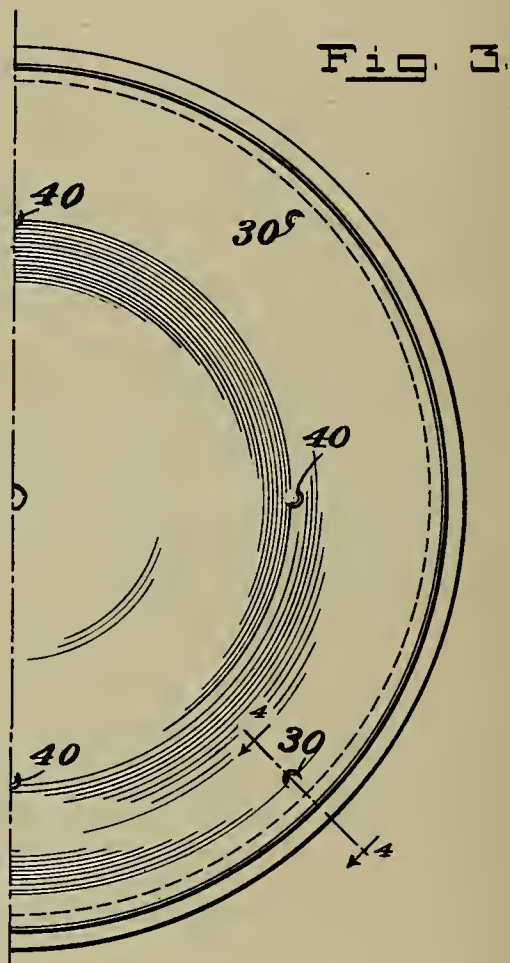
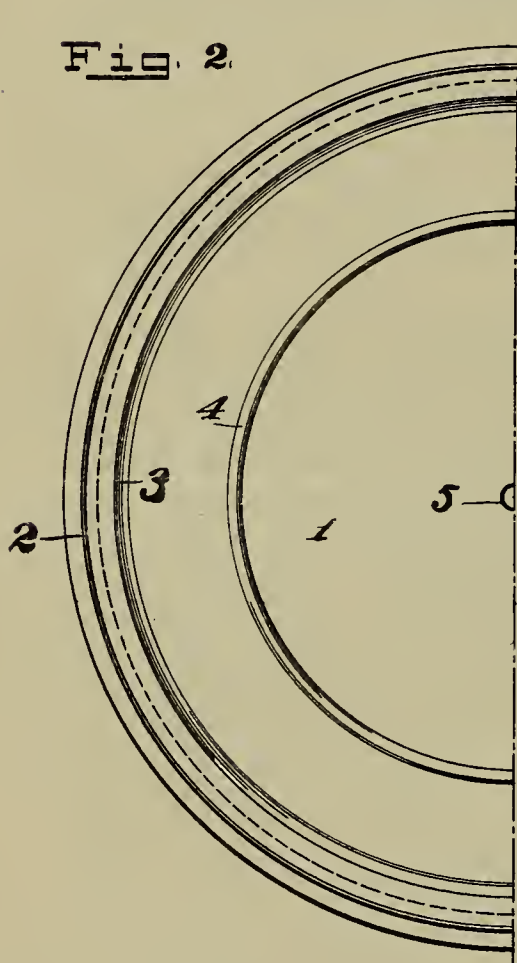
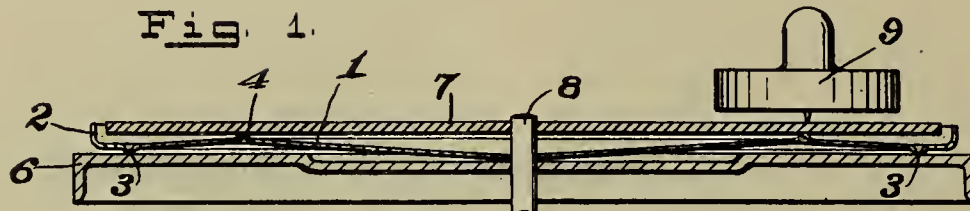
GRAPHOPHONE PATENT.

SOUNDING BOARD FOR PHONOGRAPHS,
#1,186,869-----O. B. Williams,
Patented-June 13th, 1916.
Filed-June 12th, 1915.

O. B. WILLIAMS.
SOUNDING BOARD FOR PHONOGRAPHS.
APPLICATION FILED JUNE 12, 1915.

1,186,869.

Patented June 13, 1916.



Witnesses

Charles L. Reynolds.
James E. Sproll.

Inventor

Owen B. Williams

By

Adams & Reynolds.

Attorneys

UNITED STATES PATENT OFFICE.

OWEN B. WILLIAMS, OF SEATTLE, WASHINGTON.

SOUNDING-BOARD FOR PHONOGRAPHS.

1,186,869.

Specification of Letters Patent. Patented June 13, 1916.

Application filed June 12, 1915. Serial No. 33,676.

To all whom it may concern:

Be it known that I, OWEN B. WILLIAMS, a citizen of the United States of America, and resident of the city of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Sounding-Boards for Phonographs, of which the following is a specification.

My invention relates to phonograph apparatus, or apparatus intended for reproducing sounds employing as a medium therefor permanent records, such as are employed in machines of the class defined by the generic term "phonographs."

My invention comprises certain parts and combinations thereof which will be hereinafter set forth and particularly defined in the claims terminating this specification.

The object of my invention is to eliminate certain objectionable qualities in the sounds reproduced in apparatus of this kind, particularly such sounds as harsh and unnatural tones and the squeakiness or shrill character of sounds as sometimes produced. This comprises an improvement in the tonal qualities of the sounds reproduced making them a more correct reproduction of the original sounds.

In the accompanying drawings I have illustrated my invention in the form of construction which is now preferred by me.

Figure 1 is a vertical section taken through the rotative bell or table upon which the reproducing disk is supported while in use. Fig. 2 is a half plan view of one type of construction for the novel device which constitutes my invention. Fig. 3 is a like half plan view of the same member with slight modifications of structure, and Fig. 4 is a section showing in detail the construction of the supporting foot or projection.

My invention is intended for use particularly with that type of phonographic apparatus which employs a circular disk as a recipient of the permanent record. I have discovered that by employing a sounding board as the element by which the record disk is supported, the tone of the sounds reproduced by the machine are improved and made more natural reproductions of the original sounds. I have therefore constructed a sounding board which, as herein shown, is of the outline of a disk, which is placed upon the bell or rotative table upon which the permanent record disk is placed,

and place said record disk upon said sounding board while being used.

I prefer to provide this sounding board with a peripheral flange 2 which serves to stiffen it and to maintain its correct shape. The points by which this sounding board is supported should be reduced in number and I have found the best results to follow from placing these supporting points inwardly a short distance from the outer edge of the board. The same is true with regard to the contact between the sounding board and the record and I prefer to have these latter contacts located at a still greater distance inward from the outer edge of the board.

In the half plan view shown in Fig. 2, the points of contact between the sounding board and the rotative table, or bell, 6, consists of a slight downwardly projecting circular rib 3, and the points of support for the record disk 7, consist of a like upwardly projecting circular rib 4. In the modification shown in the half plan view of Fig. 3, slight projecting knobs or legs 30 and 40 take the place of the ridges 3 and 4.

I prefer that the main body of the disk 1 which forms the sounding board, shall be composed of shallow, conical surfaces, as has been shown to a somewhat exaggerated extent in Fig. 1. From the projections 3 by which the sounding board is supported, the surface thereof slopes upwardly to the projecting supports 4, upon which the record disk rests, and then slopes downwardly to the center of the sounding board. The sounding board is provided with a central hole 5 which fits over the centering pin 8 provided for machines of this type. At 9 is shown the needle and diaphragm-carrying member of the phonograph.

I have secured good results using sounding boards which differ in some details of construction from those above described. The material of which these sounding boards are made may be varied. It should be a material having good resonant qualities and which will preserve its shape and should also be sufficiently substantial to enable it to be handled with ordinary care without injury.

As a material, I have made use of brass of different compositions and otherwise of different qualities. I do not wish to limit myself to any particular material, as I contemplate the use of any material which has

the proper resonant quality and which may be suitably made and handled.

Such a sounding board as above described and as illustrated in the drawings, may be placed directly upon the rotative bell 6 and will not raise the disk to such an extent but that the needle carrying apparatus may be applied and removed without necessitating any alterations in the apparatus. By the use of a sounding board of this character, I find that the tones of the reproduced sound are considerably improved, being clearer and more natural. There is also a softness in the tone which is quite marked when compared with the harshness sometimes found with instruments of this kind.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States of America, is:—

1. In phonographic apparatus, a sounding board of resonant material separate from and adapted to be interposed between the record and the rotative bell or table and having undamped contact with each.

2. In phonographic apparatus, a sounding board of resonant material separate from and adapted to be interposed between the record and the rotative bell or table, and having a part thereof of limited area projected to form supports upon which the record is carried.

3. In phonographic apparatus, a sounding board of resonant material separate from and adapted to be interposed between the record and the rotative bell or table having integral parts thereof of limited area projected to form supports at each side by which it is itself supported and supports the record.

4. In phonographic apparatus, a sounding board adapted to be interposed between the record and the rotative bell or table, and having supporting downward projections located inward from its periphery and upward projections for the support of the record located farther inward from the periphery.

5. In phonographic apparatus, a sounding board adapted to be interposed between the record and the rotative bell or table having

a stiffening flange extending about its periphery, and having supporting downward projections located inward from its periphery and upward projections for the support of the record located farther inward from the periphery.

6. In phonographic apparatus, a sounding board having downwardly projecting supports circularly disposed inwardly of its periphery and upwardly projecting record supports circularly disposed still farther from the periphery, the body of said sounding board containing two oppositely inclined coned surfaces joining on the circle of the record supporting projections.

7. In an apparatus for the phonographic production of sound, a support for a record during use consisting of a resonant diaphragm having its contact with the record confined to points symmetrically placed with reference to its center.

8. In an apparatus for the phonographic production of sound, a support for a record during use consisting of a resonant metallic diaphragm having direct contact with the record and the turntable and at points contained within narrow zones which are concentric with its center.

9. A device for application to phonographic apparatus comprising a resonant metallic disk adapted for insertion between the turntable and the record to support the latter, said disk having projections having like resonant qualities as the disk for supporting contact with the turntable and with the record.

10. In a sound reproducing machine, a support for a record disk consisting of a resonantly responsive member having its contact with the record disk limited to relatively small areas consisting solely of vibrant materials.

11. In a sound reproducing machine, a support for a record disk consisting of a resonantly responsive member having its contact with the record disk and with its support limited to relatively small areas consisting solely of vibrant materials.

Signed at Seattle, Washington, this 7th day of June 1915.

OWEN B. WILLIAMS.

TOP SUPPORT FOR TALKING MACHINE
AND OTHER CABINETS,
#1,187,040-----F. L. Capps,
Patented-June 13th, 1916.
Filed-March 31st, 1913.

F. L. CAPPS.
 TOP SUPPORT FOR TALKING MACHINE AND OTHER CABINETS.
 APPLICATION FILED MAR. 31, 1913.

1,187,040.

Patented June 13, 1916.

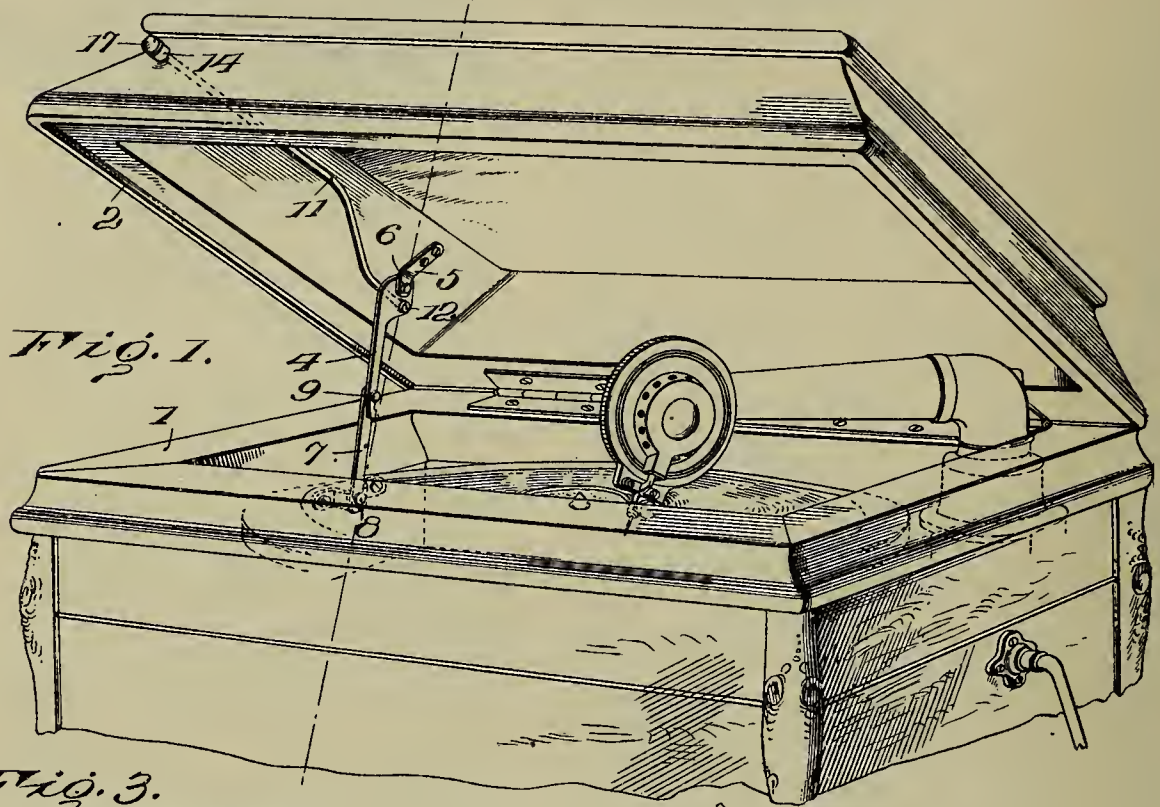


Fig. 3.

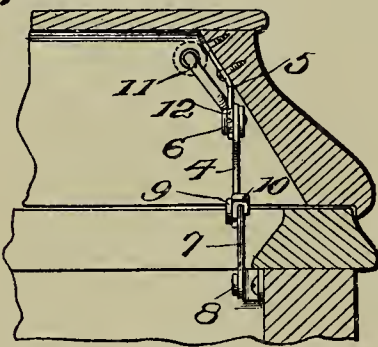
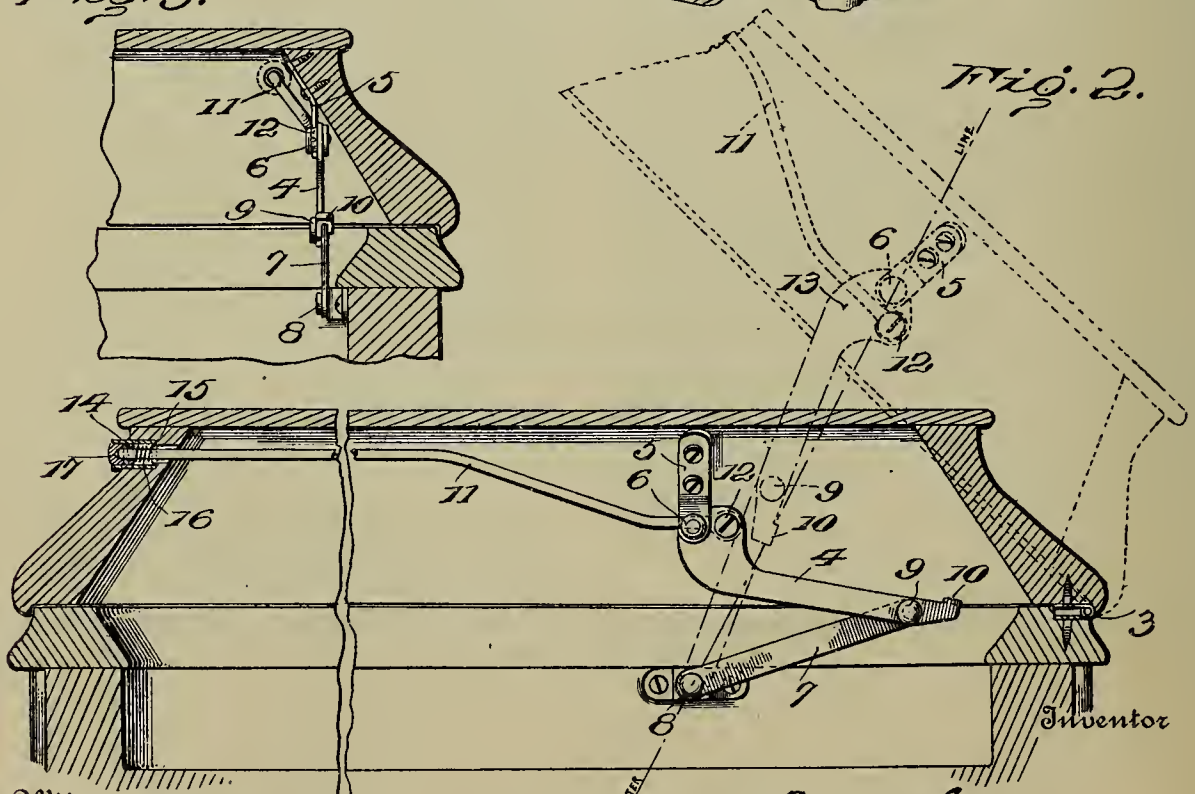


Fig. 2.



Witnesses
 Rich C. Fitzhugh.
 C. E. Warfield

Frank L. Capps.
 By
 Mauro. Cameron, Lewis & Kassie
 Attorneys

UNITED STATES PATENT OFFICE.

FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

TOP-SUPPORT FOR TALKING-MACHINE AND OTHER CABINETS.

1,187,040.

Specification of Letters Patent.

Patented June 13, 1916.

Application filed March 31, 1913. Serial No. 757,865.

To all whom it may concern:

Be it known that I, FRANK L. CAPPS, a citizen of the United States, of Bridgeport, Connecticut, have invented a new and useful Improvement in Top-Supports for Talking-Machine and other Cabinets, which invention is fully set forth in the following specification.

My invention relates to cabinets for talking machines and other devices in which a hinged top is employed, and has for its object to provide efficient and convenient means for supporting the top in its raised or elevated position to afford access to the interior of the machine, and for readily lowering the top. As heretofore constructed, the top-retaining means for such cabinets have been of such character that, in the act of lowering the top, one hand had to be employed to support the top and the other one to trip or release the top-retaining means.

A further object, therefore, of the present invention is to provide means whereby the top-retaining means may be readily released, and the top lowered by the use of but one hand of the operator.

With this object in view, the invention consists, generally stated, in a toggle construction which, when the toggle is extended, operates to hold the top elevated, combined with suitable means, such as a push-rod, for breaking the toggle, and permitting the lowering of the top, the push-rod having a part projecting to the exterior of the top, in position to be actuated by the thumb of the same hand that grasps the top for lowering it.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings, but it is to be understood that said drawings are for the purpose of illustration only, and are not to be taken as defining the limits of the invention, reference being had to the claims for this purpose.

In said drawings—Figure 1 is a perspective view of a cabinet with my invention applied thereto, with the top elevated; Fig. 2 is a vertical cross-section of a cabinet with the top closed, showing my retaining device in side elevation, the dotted lines indi-

cating the position of the parts with the top elevated; and Fig. 3 is a broken vertical section through the cabinet to the rear of the top-retaining device looking toward the front of the cabinet.

Referring to the drawings, in which like reference numerals indicate corresponding parts, the cabinet is shown as composed of a body 1 having a top 2, hinged thereto at 3. A toggle-link 4 is pivoted to the top 2, preferably by securing a bracket-arm 5 to the top and pivoting the link to said bracket-arm at 6. A second toggle-link 7 is pivoted, in any suitable manner, to the body of the cabinet at 8, the pivot-point 6 being above, and the pivot-point 8 below, the line where the top of the cabinet meets the body thereof. As clearly shown in the drawing, one of the links (in this case the link 4 connected to the top) has its outer pivot offset from the longitudinal axis of the link. The two toggle-links 4 and 7 are pivoted together at 9, and on the end of the link 4, prolonged beyond the pivot-point 9, is a stop 10 composed of a part projecting at right-angles to the plane of the links 4 and 7, so that the stop will engage the link 7, in the act of raising the top 2, slightly after the axis of the pivot 9 has passed a straight line extending between the pivots 6 and 8, as clearly shown in Fig. 1 in full lines and Fig. 2 in dotted lines. Offsetting of the pivot 6 makes it possible for the stop 10 to be so placed as to hold the links with their longitudinal axes forming one straight line as clearly shown in Fig. 2. This construction enables the links to make a much better appearance than they would if positioned at an angle to each other. With the construction shown and described, the weight of the top acts to hold the toggle open, and to force the pivot 9 to the left, as shown in Fig. 2, and to lower the top, it will be evident that it is necessary to break the toggle to the right by forcing the pivot-pin 9 to the right of the line between the pivots 6 and 8. For accomplishing this purpose, I provide any suitable means whereby the operator may impart the proper thrust upon the toggle. As here shown, such means assume the form of a push-rod 11, pivotally attached to the toggle 4 at a point 12, located in the enlarged end 13 of the link 4. This enlargement 13 of the end of the link 4 constitutes an offset to the

general form of the link, and in effect makes of the link 4 a bell-crank lever, one of whose arms extends between the pivots 6 and 9, and the other between the pivots 6 and 12, the latter of which is the short arm of the bell-crank lever. A very small movement of this short arm at the point 12 will be converted into a much more extensive movement of the long arm at the point 9, the pivot between the two toggle-links. The pivot 12 is so located that when the toggle is broken, as shown in full lines in Fig. 2, the axis of the rod 11 approximately intersects the axis of the pivot 6. In effect, upon the breaking of the toggle the pivot 12 reaches a dead center with respect to the rod, and thus automatically limits the inward movement of the rod.

The push-rod 11 is preferably curved upward, for the purpose of more effectually concealing it in the top of the cabinet, and extends out through the front wall of the top through an opening, in which is inserted a sleeve 14 whose internal diameter exceeds that of the diameter of the rod 11. The interior end of the sleeve is provided with an inturned flange or other abutment 15, and a spring 16 reacts between said abutment and a button 17 on the end of the rod, which button is of a diameter to permit it to slide freely within the sleeve. The proportions of the parts are such that when the top is in lowered position, as shown in full lines in Fig. 2, the button 17 lies flush with the outer end of the sleeve 14, but when the parts are in elevated position, as shown in Fig. 1, the button 17 protrudes from the sleeve 14. This is due to the fact that the pivot-point 12, whereby the rod 11 is connected to the link 4, is moved to the rear in the act of lowering the top.

The result of this construction is (the top being elevated) that, when the thumb of the operator is applied to the button 17, and the point 12 forced rearward by the thrust on the rod 11, the link 4, and with it the pivot-point 9, is moved to the rear of a straight line connecting the pivot-points 6 and 8 of the toggle, thereby breaking the toggle, and permitting it to be closed and the top to be lowered, as clearly shown in full lines in Fig. 2.

It will be apparent that, by this construction, the opening movement of the top is limited; the weight of the top serves to hold the retaining device in position to keep the top elevated; and that the operator may seize the top when elevated with his left hand, and by pressing upon the button 17 with the thumb thereof, break the toggle and readily lower the top. Furthermore, the parts of the device are efficiently concealed, so that they do not mar the appearance of the cabinet as a whole.

Various modifications may be made in the

proportions and arrangement of the parts, without departing from the spirit of the invention defined in the accompanying claims.

What is claimed is:—

1. In a cabinet, the combination of a body and a top hinged thereto, with a toggle for retaining the top elevated, the said toggle being entirely within the cabinet when the cabinet is closed, and a push-rod positioned in the cabinet and carried by the top and engaging the toggle, whereby the latter may be broken to permit the top to be lowered.

2. In a cabinet, the combination of a body, a top hinged thereto at one edge and provided with side and end walls and a top wall, a toggle for retaining the top elevated, the said toggle being entirely within the cabinet when the cabinet is closed, and a push rod mounted within the said top and engaging the toggle to cause it to be broken.

3. In a cabinet, the combination of a body, a top hinged thereto at one edge and provided with side and end walls and a top wall, a toggle for retaining the top elevated, the said toggle being entirely within the cabinet when the cabinet is closed, a push button carried by the top at a point remote from the hinged edge, and a push rod mounted within the said top and extending from the push button to the toggle to cause the latter to be broken.

4. In a cabinet, the combination of a body and a top hinged thereto, with a toggle for retaining the top elevated, the said toggle being entirely within the cabinet when the cabinet is closed, one of the toggle links being pivotally connected to the body and one to the top, a stop limiting the movement of the toggle on one side of its fully open line, and a push-rod carried by the top and engaging the toggle and operable to break it to permit the top to be lowered.

5. In a cabinet, the combination of a body and a top hinged thereto, with a toggle having one link pivoted to the body and one to the top, a push-rod pivoted to one of the toggle links near its pivot-point, and a spring associated with said push-rod for yieldingly holding said toggle in open or extended position.

6. In a cabinet, the combination of a body and a top hinged thereto, with a toggle retaining the top elevated, said toggle being located within the cabinet, a push-rod engaging the toggle and operable to break the toggle to lower the top, said rod being within the cabinet but having a part projecting out through the wall thereof, and a spring engaging the push-rod and thereby acting to yieldingly hold said toggle in open or extended position.

7. In a cabinet, the combination of a cabinet body, a top hinged to the body along one edge, two toggle links pivoted together and having their outer ends pivoted respectively

to the top and to the body, one of the end pivots being at one side of the longitudinal axis of the corresponding link and the other pivots being in the longitudinal axis, means for limiting the relative movements of the two links with the said longitudinal axes forming one straight line, a push rod carried by the top for moving the links out of the straight line position, and a spring for automatically moving the links into the straight line position.

8. In a cabinet, the combination of a cabinet body, a top hinged to the body along one edge, two toggle links pivoted together and

having their outer ends pivoted respectively to the top and to the body, and a push rod pivoted at one end to one of the links near its outer pivot, the axis of the push rod approximately intersecting the axis of the said outer pivot when the toggle is broken.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

FRANK L. CAPPS.

Witnesses:

M. E. LYLE,

J. S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

The first of the most important facts in the history of the world is the fact that the world is not a uniform whole. It is a collection of many different parts, each of which has its own history and its own character. The second fact is that the world is not a static whole. It is a collection of many different parts, each of which is constantly changing and developing. The third fact is that the world is not a simple whole. It is a collection of many different parts, each of which is constantly changing and developing.

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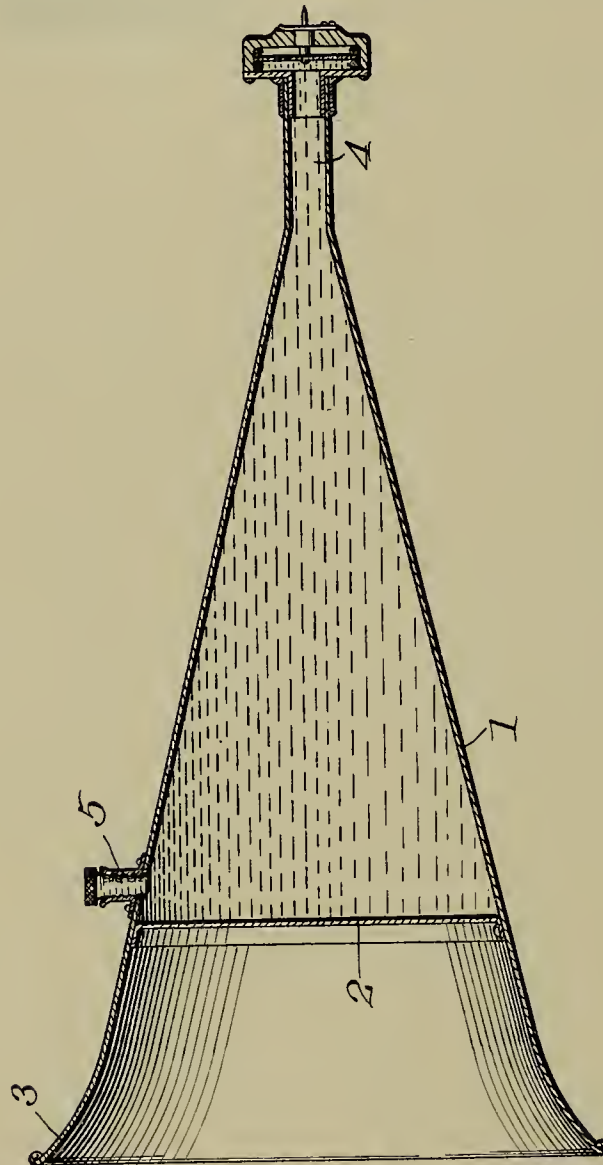
MEANS FOR MAKING AND REPRODUCING
PHONOGRAPH RECORDS,

#1,187,119-----C. F. Winch,
Patented-June 13th, 1916.
Filed-Sept. 26th, 1914.

C. F. WINCH.
MEANS FOR MAKING AND REPRODUCING PHONOGRAPH RECORDS.
APPLICATION FILED SEPT. 26, 1914.

1,187,119.

Patented June 13, 1916.



WITNESSES
A. B. Townsend.
Henry A. Gens.

INVENTOR
Charles F. Winch
BY
Townsend & Secker
ATTORNEYS.

UNITED STATES PATENT OFFICE.

CHARLES F. WINCH, OF NEW YORK, N. Y.

MEANS FOR MAKING AND REPRODUCING PHONOGRAPH-RECORDS.

1,187,119.

Specification of Letters Patent.

Patented June 13, 1916.

Application filed September 26, 1914. Serial No. 863,616.

To all whom it may concern:

Be it known that I, CHARLES F. WINCH, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Means for Making and Reproducing Phonograph-Records, of which the following is a specification.

My invention relates to apparatus for use in connection with sound recording and reproducing machines and has to do more particularly with a means for taking up and transmitting the sounds to or from the stylus or needle which engages the record.

A principal object of the invention is to produce a greater amplitude of movement of the stylus in response to the vibrations set up by the speaker or singer than is possible by previous constructions and at the same time to secure an action of said stylus that shall follow positively and faithfully the vibrations produced by the speaker or singer whose voice is to be recorded.

A record produced by apparatus made in accordance with my invention may be used to reproduce the sounds recorded not only with great volume but also with great fidelity in respect to the finer vibrations representing quality in the recorded sound. Owing to the positive action and great amplitude of movement of the stylus the sound may be faithfully recorded on a surface or in a line of less extent than is ordinarily required since the finer vibrations will be distinctly produced on the record and the recording surface may be run at less speed than is ordinarily required in order to obtain a record from which said finer vibrations may be distinctly reproduced.

Other advantages will also result from the use of my invention and will be obvious to those skilled in the art.

Essentially my invention consists of a liquid holding receptacle having a diaphragm closing one wall or side thereof and of larger area than the stylus carrying diaphragm and having also a liquid outlet by which the body of liquid with which the diaphragm is in contact may be placed in communication with the diaphragm carrying the recording stylus or needle.

The preferred form of carrying out my invention is shown in the accompanying drawings wherein a horn like the ordinary sound gathering horn of a phonograph recorder or

reproducer is shown constructed as a liquid tank with a sound receiving or producing diaphragm located in or near the mouth of the same, suitable means being also provided for permitting the filling of the tank with a liquid. This particular form of my invention may be conveniently described as a phonograph tank horn.

The drawing shows this form of my invention in vertical central section.

1 is the body of the horn and 2 is the diaphragm which is set in the body of the horn near the larger rim thereof and in position to receive the waves or vibrations that are to be recorded or to produce waves when used with or as a reproducer.

The walls of the horn may be extended as shown to form a sound collector 3 for collecting the sounds and causing them to impinge upon the face of the diaphragm 2. Said diaphragm is set into the horn in a water-tight manner and said diaphragm is at such position in the horn or of such extent as to be of greater area than the stylus carrying diaphragm of the particular recorder with which it is to be used.

The horn terminates in an outlet pipe 4 with which may be employed suitable means for coupling the horn to the recorder or reproducer proper and in a liquid-tight manner. This outlet 4 may be flexible for convenience of attachment. If the recorder or reproducer proper be not so constructed as to be liquid-tight suitable gaskets or washers may be used at the edge of the stylus carrying diaphragm, but as this is a mechanical detail as to which I make no claim of invention, the same need not be described with greater particularity.

To fill the horn with liquid when it has been placed in position in connection with the recorder or reproducer, a suitable funnel 5 may be employed therewith, said funnel being provided preferably with a stopper that may be inserted into full contact with the body of liquid when the tank is filled, so that there may be no opportunity for movement of the liquid excepting through the outlet 4.

The apparatus is used in the same way as the ordinary air horn by directing the sounds to be recorded into the apparatus, but in my invention the sounds impinge upon the diaphragm 2 and upon well-known hydrostatic principles the vibrations or movements of the diaphragm, which is of

comparatively large area as compared with the outlet 4, are transmuted owing to the incompressible nature of the liquid into movements of the body or column of liquid in the outlet 4, which are of much larger extent than those of the diaphragm itself, and these movements being transmitted through the body of liquid to the diaphragm carrying the stylus produce an action thereof which is a positive action and faithfully reproduces the movements of the diaphragm 2; but owing to the relative size of the diaphragms the stylus carrying diaphragm moves with larger excursions than the diaphragm 2. Hence, a record will be produced in which each individual depression or excursion will be magnified; and so that sounds reproduced therefrom will be of greater volume besides being faithful reproductions of the original sound impinging upon the diaphragm 2.

As an appliance for use in recording sounds my invention is especially useful but for reproducing sounds my improved tank horn also possesses great advantages since, as will be obvious, the connection 4 may be of any desired length and may therefore be extended from the reproducer itself to any desired point in an auditorium devoted to the reproduction of plays by moving pictures ac-

companied by the voice of the actor. When so used the voice of the speaker may be reproduced without diminution of volume at great distances, owing to the fact that the sound is conveyed through a liquid which, as is well-known, is a better transmitter of sound than air. Furthermore, owing to the fact that the liquid such as water will convey the sound at a much greater speed than air there results a more perfect synchronism of the sounds with the motions of the picture at all portions of the auditorium in which the tank horns may be located.

What I claim as my invention is:—

The phonograph tank horn herein described; closed at its larger end by a diaphragm for receiving or reproducing sound waves and containing a liquid in direct contact with said diaphragm and connected at its smaller end by a liquid-tight passage with the receiving or reproducing instrument, as and for the purpose set forth.

Signed at New York, in the county of New York and State of New York, this 25th day of September, A. D. 1914.

CHARLES F. WINCH.

Witnesses:

F. B. TOWNSEND,
HENRY A. GENS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPHOPHONE PATENT.

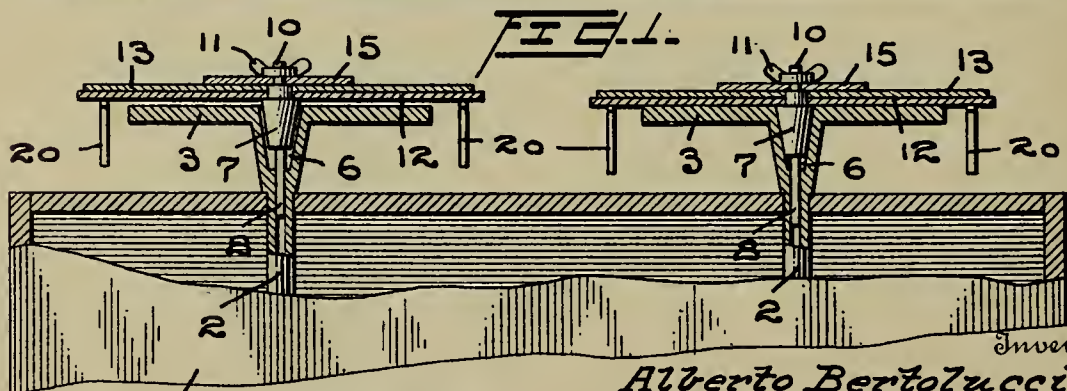
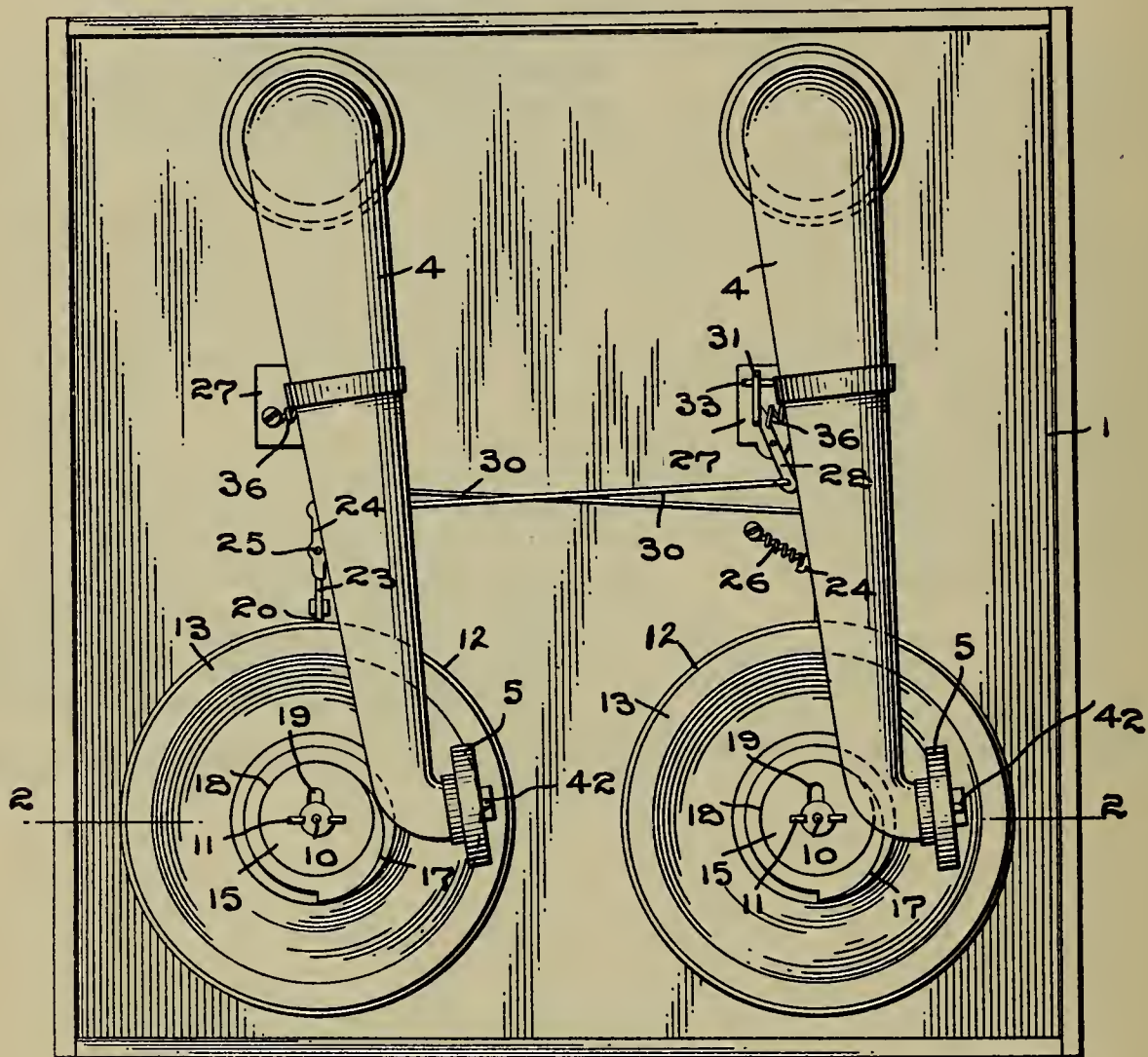
TALKING MACHINE,

#1,187,129-----A. Bertolucci,
Patented-June 13th, 1916.
Filed-April 26th, 1915.

A. BERTOLUCCI.
TALKING MACHINE.
APPLICATION FILED APR. 26, 1915.

1,187,129.

Patented June 13, 1916.
3 SHEETS—SHEET 1.

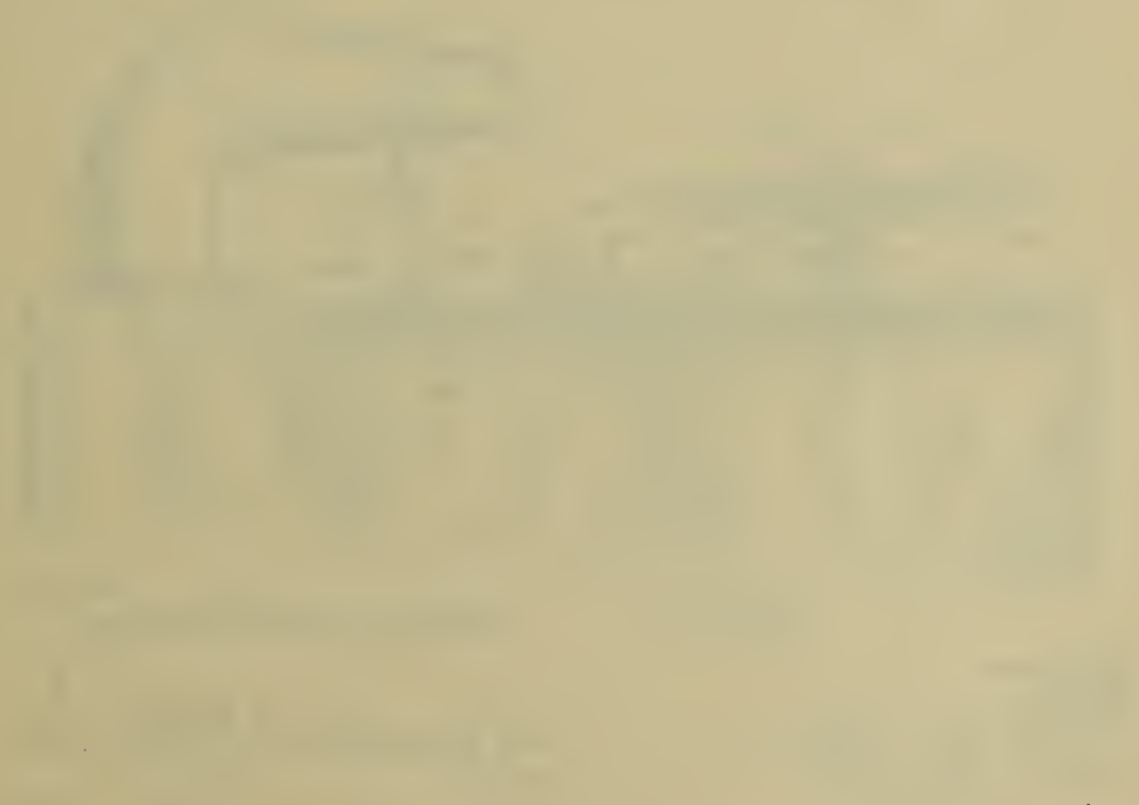
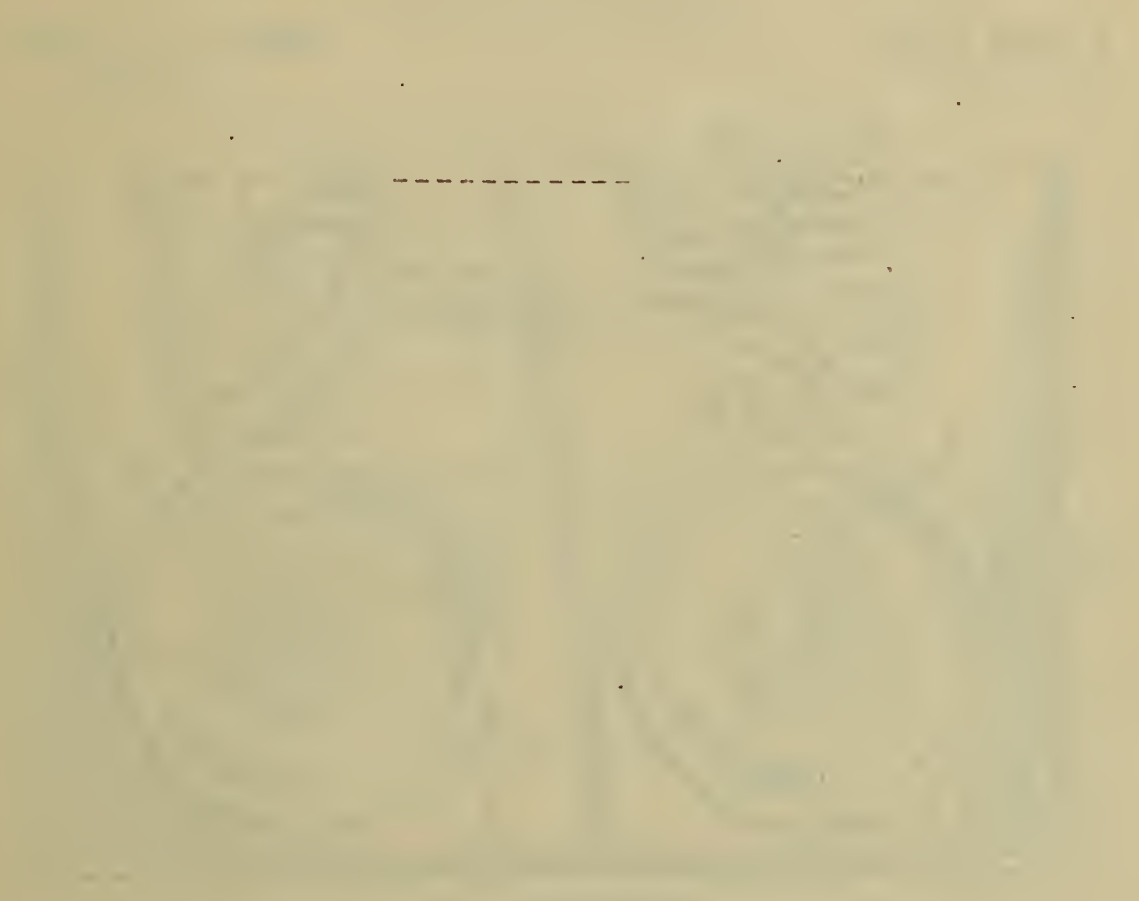


Witnesses

L. D. Mager
C. R. Ziegler.

Inventor
Alberto Bertolucci,

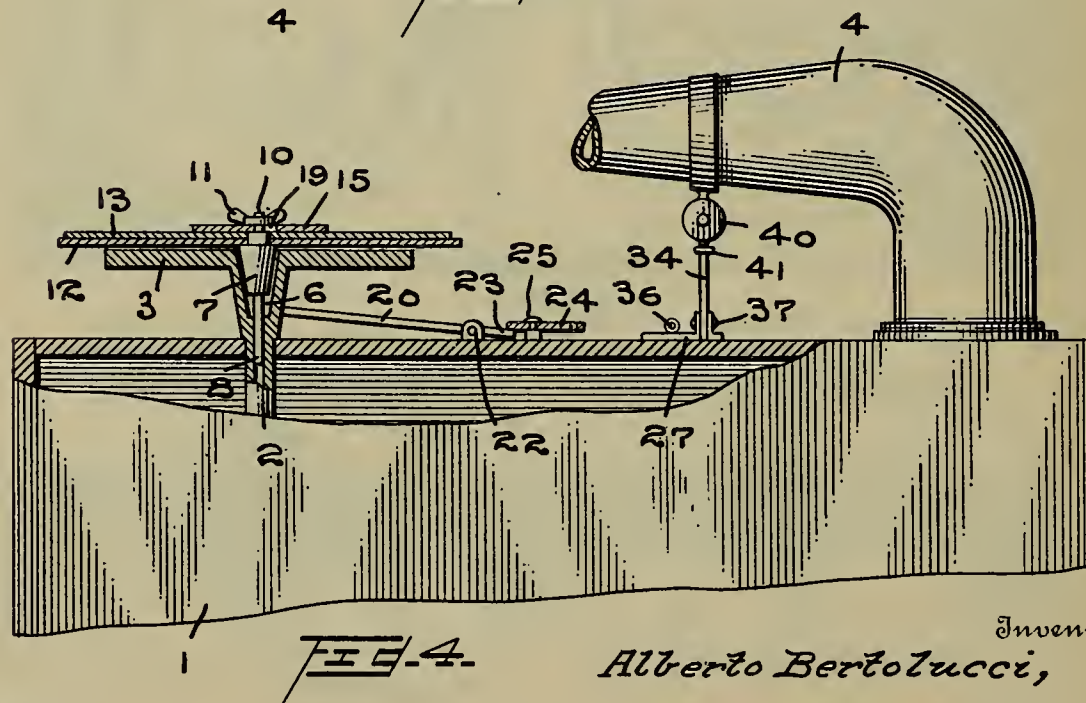
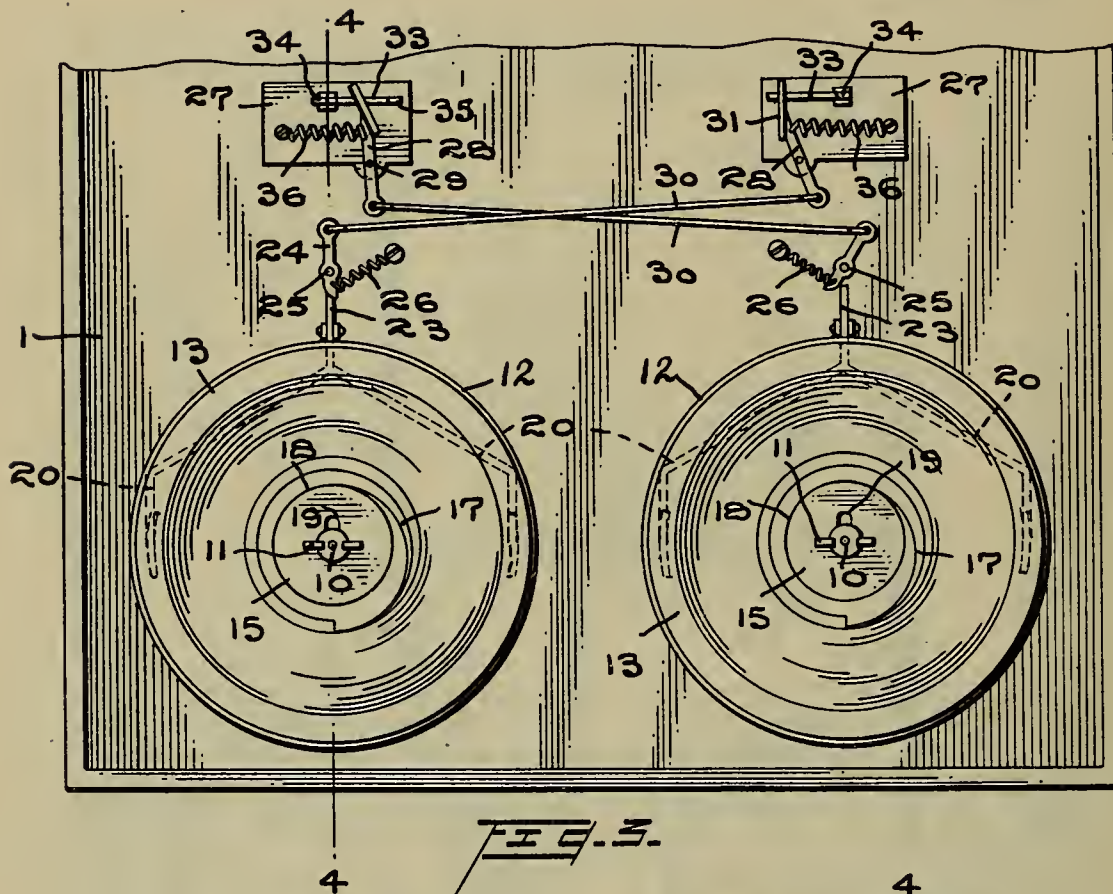
By *Joshua R. H. Fols.*
his Attorney



1,187,129.

Patented June 13, 1916.

3 SHEETS—SHEET 2.

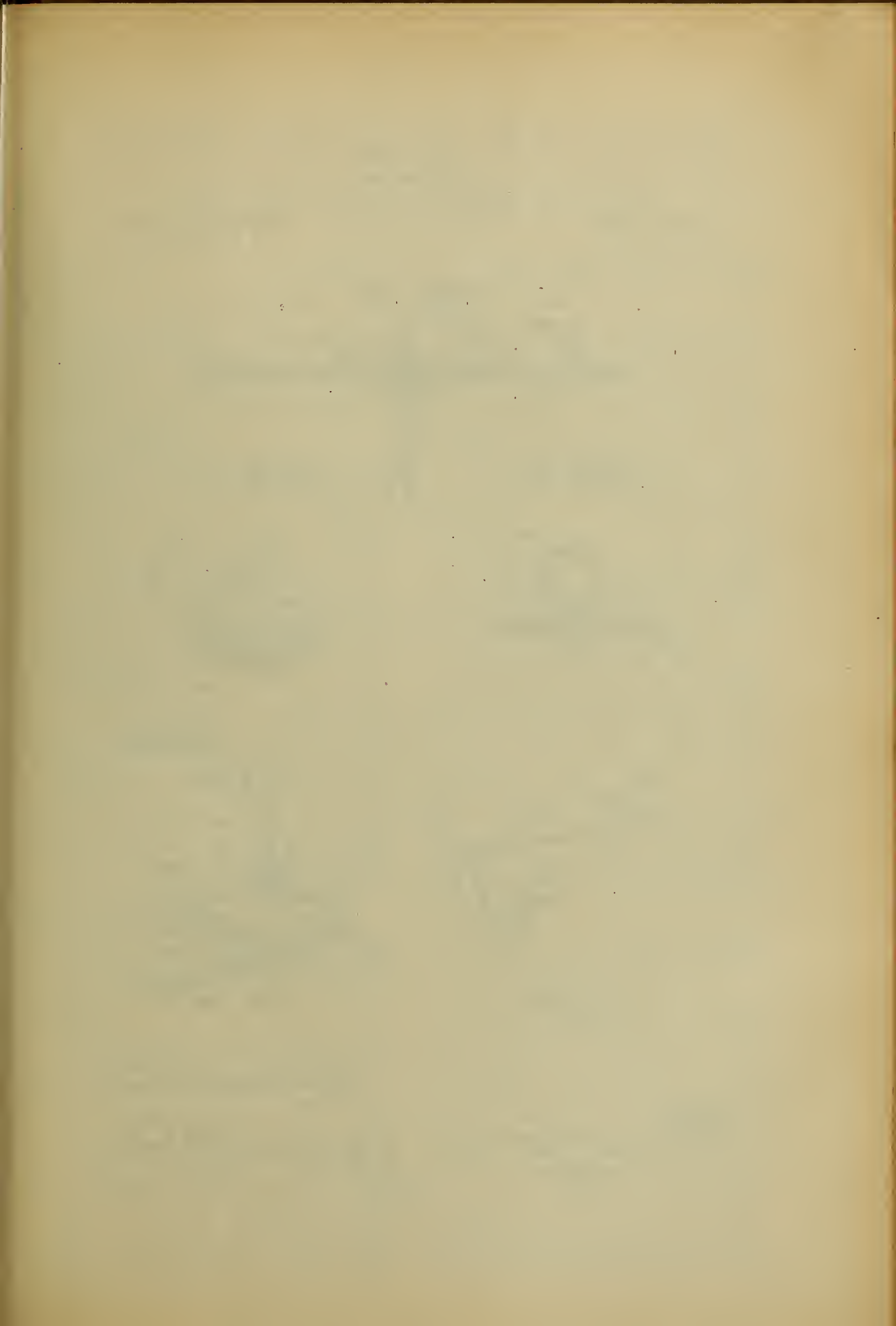


Inventor
Alberto Bertolucci,

Witnesses

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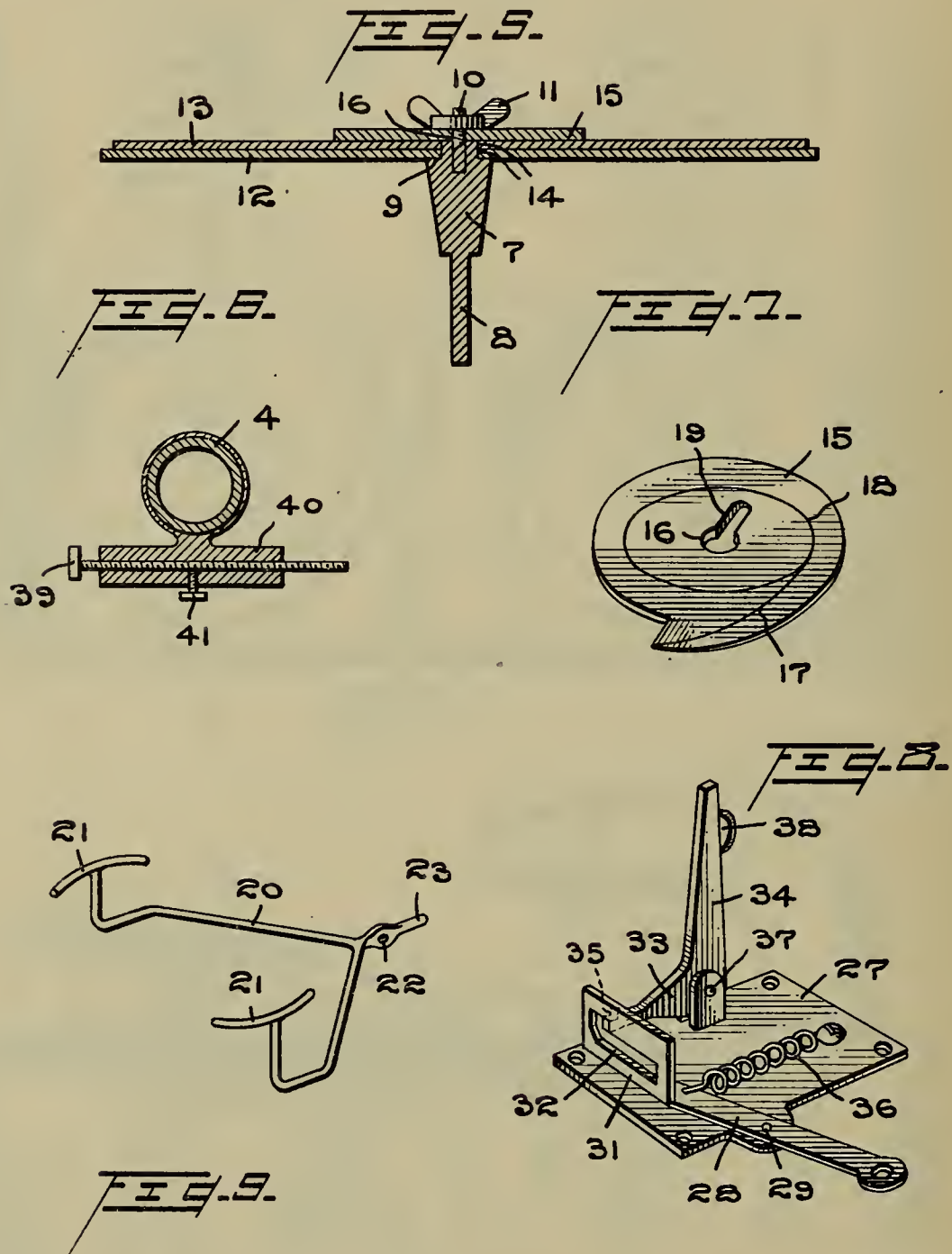
By *Joshua R. H. Potts.*
his Attorney



A. BERTOLUCCI.
TALKING MACHINE.
APPLICATION FILED APR. 26, 1915.

1,187,129.

Patented June 13, 1916.
3 SHEETS—SHEET 3.



Inventor
Alberto Bertolucci,

Witnesses
L. R. Moyer
C. R. Ziegler.

By Joshua R. H. H. H. H.
his Attorney

UNITED STATES PATENT OFFICE.

ALBERTO BERTOLUCCI, OF PHILADELPHIA, PENNSYLVANIA.

TALKING-MACHINE.

1,187,129.

Specification of Letters Patent.

Patented June 13, 1916.

Application filed April 26, 1915. Serial No. 23,984.

To all whom it may concern:

Be it known that I, ALBERTO BERTOLUCCI, a subject of the King of Italy, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to improvements in talking machines, the object of the invention being to provide improved means for playing a number of records one after the other, utilizing improved means for causing the second record to start instantly with the conclusion of the first record.

A further object is to provide improved means for positioning records above continuously revolving turn tables, and so connect the several parts of the mechanism as to cause the second record to drop into playing position when the first record is completely played.

A further object is to provide an improved construction of turn table and disk record supporting means above the same with improved means secured above the disk record for causing the movement of the tone arm, whereby the latter through suitable mechanism, compels the operation of the next record, so that there is practically no lapse of time between the playing of one record and the other, thus enabling operas and other long records to be divided onto a plurality of disks, and the disks played in succession.

With these and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings: Figure 1 is a top plan view illustrating my improvements. Fig. 2 is a fragmentary view in transverse section on the line 2—2 of Fig. 1. Fig. 3 is a fragmentary plan view omitting the tone arms and sound boxes. Fig. 4 is a view partly in side elevation and partly in section, the section being taken on the line 4—4 of Fig. 3. Fig. 5 is an enlarged view in section illustrating the record holding plate and its cooperating parts. Fig. 6 is an enlarged view in transverse section through the tone arm and the trip engaging member attached thereto. Fig. 7 is a perspective view of the cam 15.

Fig. 8 is a perspective view of the tripping mechanism, and Fig. 9 is a perspective view of the plate supporting frame.

1 represents the box of a talking machine, and 2, 2, are vertically positioned tubular shafts extending above the box and supporting turn tables 3 thereon. I have not attempted to illustrate any motor or mechanism for operating the shafts 2, but it is to be understood that these shafts are continuously revolved in the same direction, and I may utilize any form of mechanism for driving them.

4, 4, represents two tone arms carrying sound boxes 5 at their free ends, and while I have illustrated my invention in connection with two turn tables 3 and cooperating parts, I would have it understood that I may employ any desired number.

The turn tables 3 at their centers are provided with conical recesses 6 to receive conical enlargements 7 on record guiding rods 8. Each rod 8 fits within the hollow shaft 2, and at its upper end is reduced in diameter forming a shoulder 9, and is provided at its upper end with a threaded lug 10 for the reception of a thumb nut 11 for a purpose which will hereinafter appear.

12 represents a flat plate which is preferably provided with some friction material on its lower face, so that when it contacts with the surface of the turn table, which latter is also preferably provided with some friction material, the parts are compelled to turn together.

13 is an ordinary record disk, and plate 12 and disk 13 are provided with central openings 14 to receive the upper end of the rod 7 and rest upon the shoulder 9.

15 represents a cam which is provided with a central opening 16 to receive the lug 10, and when the thumb nut 11 is screwed into place, the cam 15, disk 13, and plate 12 will be rigidly secured to the rod.

The part 15 I term a "cam," because it is provided with a cam groove 17 connecting the extreme edge of the cam with a circular groove 18, and it is the intention to so position this cam that the groove 17 will register with the end or inner groove of the record disk, so that when the needle or stylus reaches the end of the record, it will follow the groove 17 into the groove 18, and thus cause the tone arm to move rapidly to one side and during this movement, operate my improved tripping mechanism shown in de-

tail in Fig. 8. The cam 15 is made with a slot 19, so that it is capable of a wide range of adjustment to properly position the groove 17 in accordance with the record.

5 It is, of course, to be understood that I will provide a number of rods 7 with plates 12, disks 13, and cams 15, so that these parts may be arranged and located on the turn tables.

10 The plates 12 are normally held in an elevated position by means of a frame 20 shown in perspective in Fig. 9. This frame 20 has two supporting arms 21 which engage the plate 12 outside of table 3 as shown in Fig.

15 3, and normally hold the plate elevated so that the table turns freely without turning the plate. The frame 20 is of general fork shape pivotally mounted at 22, and having a lug 23 projecting beyond the pivot. It is

20 to be understood, of course, that there are two frames 20, or in other words as many frames as there are turn tables, and the frames are normally held in elevated position by pivoted catches 24. These catches

25 24 are horizontally positioned on the box 1, pivotally supported between their ends as shown at 25, and at one end are adapted to be positioned above the lugs 23 of frames 20 and hold the frames in their elevated position.

30 26 is a coiled spring exerting pressure on the catch 24 to move the same from its set position to the position shown at the right of Fig. 3.

35 On the box 1, I locate two plates 27, and these plates support what I term my improved tripping mechanism, one of which mechanisms is illustrated in perspective in Fig. 8. On the plates 27, levers 28 are pivotally supported between their ends as

40 shown at 29, and at one end are connected by rods 30 with the catches 24. The other ends of the levers 28 are formed with upwardly projecting plates 31 having slots 32

45 therein into which the shorter members 33 of tripping levers 34 project. This shorter member 33 has a notched end 35 against which the plate 24 is normally held by a spring 36, but when the shorter member 33

50 of lever 34 is moved downwardly, spring 36 operates to swing lever 28, and the peculiar shape of slot 32 allows the plate 31 to move toward the pivot 37 of lever 34. This movement of the lever 28 exerts a pull on rod 30

55 to throw the catch 24 and release the frame 21, which permits the plate 12 and parts carried thereby to fall by gravity, and hence move into frictional engagement with the turn table to cause the instant movement of the record.

60 Levers 34 are provided with enlargements 38 which are adapted to be engaged by screws 39 supported in brackets 40, the latter secured to the tone arms 4. The screws 39

tioning of the same, and are clamped by set screws 41 against movement.

Figs. 1 and 2 illustrate the position of the parts in normal operation. The turn table 3, at the right, is causing the record disk 13 to revolve, and move the tone arm 4 toward the left of Figs. 1 and 3.

It will be noted that the record 13 at the left of Figs. 1 and 2 is elevated, so that the turn table 3 can revolve without turning the record. As soon as the record at the right is completely played, the needle or stylus 42 will ride into the groove 17 of cam 15, and the tone arm 4 at the right will be

given a quick movement which will be sufficient to move the screw 39 against the tripping lever 34, causing the release of the catch 24, at the left of Figs. 1 and 2, whereby frame 20 is released and the plate 12

and disk 13 will fall by gravity into operative position and instantly the turn table 3 at the left will begin to revolve the record whereby it will begin to play. By reason of this construction, as soon as one record is finished another one will instantly

begin, and while the second record is being played, a third record can be positioned on the first-mentioned turn table, and by this means a long opera or other record may be continuously operated without stopping.

Various slight changes might be made in the general form and arrangement of parts described without departing from my invention, and hence I do not limit myself to the precise details set forth, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with two turn tables, and pivoted tone arms movable above the turn tables, of disk supporting plates above the turn tables, frames normally holding the plates elevated above the turn tables, mechanical catches holding the frames in the last-named position, mechanical tripping devices engaged by the tone arms, and rods connecting the tripping devices and the catches, whereby the movement of the tripping devices by the tone arms compels the mechanical operation of the catches to release the frames, substantially as described.

2. The combination with two turn tables, and pivoted tone arms movable above the turn tables, of disk supporting plates of appreciably greater diameter than the turn tables, frames engaging the plates at opposite sides of the turn tables, and normally holding the plates elevated above the turn tables, mechanical catches holding the frames in position to maintain the disks elevated, mechanical tripping devices located

in the path of movement of the tone arms and engaged directly by the tone arms, and rods connecting the respective tripping devices with the catches, whereby the operation of one tripping device by a tone arm causes the release of the catch controlling the disk below the other tone arm, substantially as described.

3. The combination with two turn tables, and pivoted tone arms movable above the turn tables, of disk supporting plates of appreciably greater diameter than the turn tables, frames engaging the plates at opposite sides of the turn tables, said frames each having two supporting members located at opposite sides of the turn tables and having segmental supports thereon directly engaging the plates, and normally holding the plates elevated above the turn

tables, mechanical catches holding the frames in position to maintain the disks elevated, mechanical tripping devices located in the path of movement of the tone arms and engaged directly by the tone arms, and rods connecting the respective tripping devices with the catches, whereby the operation in the path of movement of the tone arms causes the release of the catch controlling the disk below the other tone arm, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALBERTO BERTOLUCCI.

Witnesses:

MARIE JACKSON,
CHAS. E. POTTS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPHOPHONE PATENT.

SOUND BOX FOR PHONOGRAPHS,
#1,187,146-----N. H. Holland,
Patented-June 13th, 1916.
Filed-February 17th, 1911.

N. H. HOLLAND.
SOUND BOX FOR PHONOGRAPHS.
APPLICATION FILED FEB. 17, 1911.

1,187,146.

Patented June 13, 1916.

Fig. 1

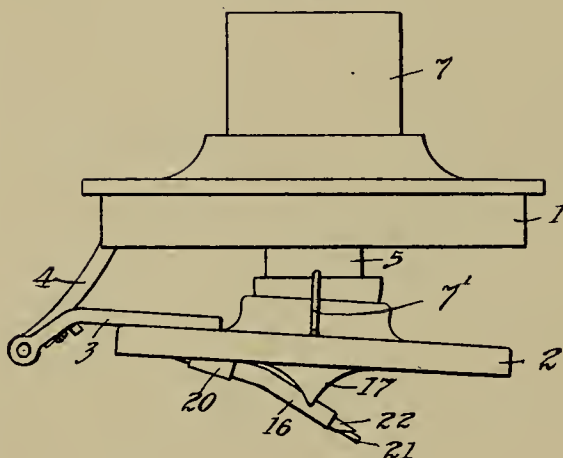


Fig. 2

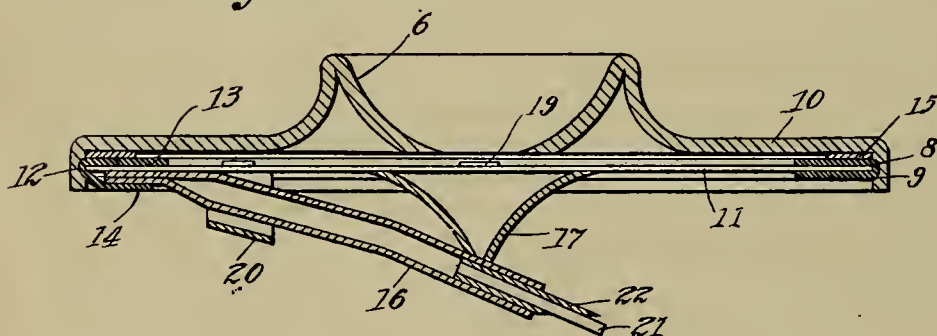
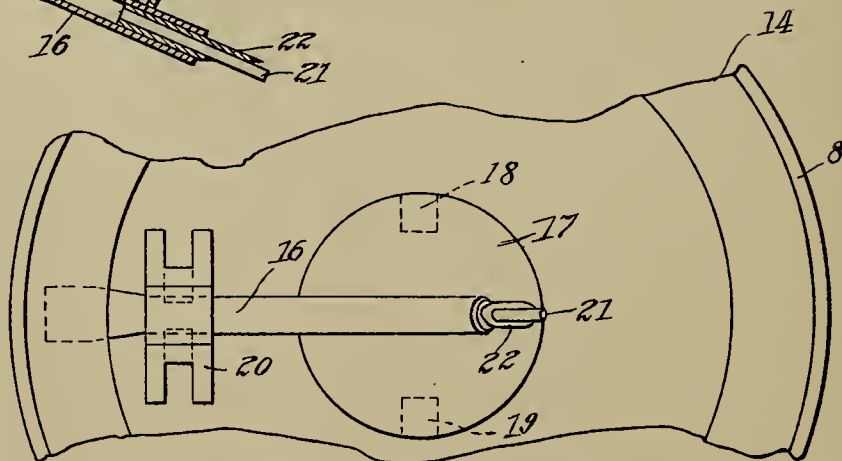


Fig. 3



Witnesses:
A. B. Dressler
Frederick Bachmann

Inventor:
Newman H. Holland
by Frank E. Dyer
His Atty.

UNITED STATES PATENT OFFICE.

NEWMAN H. HOLLAND, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR PHONOGRAPHS.

1,187,146.

Specification of Letters Patent.

Patented June 13, 1916.

Application filed February 17, 1911. Serial No. 609,101.

To all whom it may concern:

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Phonographs, of which the following is a description.

My invention relates to sound boxes and more particularly to that part of a sound box which carries the diaphragm and the stylus. It has heretofore been customary to mount the stylus of a recorder in an arm or lever disposed at an angle with reference to the diaphragm and secured thereto both at the center and at the periphery thereof. This construction is objectionable in that the inclined stylus arm acts as a brace and thereby brakes or dampens the vibrations of the diaphragm.

It is my object to eliminate this objection by securing the stylus arm to the diaphragm in such a way that the portion of the said arm which is adjacent the periphery of the diaphragm will be movable with reference to the latter.

Another object of my invention is to provide a new and improved means for securing the diaphragm to its support without the use of adhesives, screws, or other similar fastening means.

Other objects of my invention will appear more fully in the following description and in the appended claims.

In order that my invention may be better understood, attention is hereby directed to the accompanying drawing forming a part of this specification, and in which:—

Figure 1 is a side elevation of a recorder embodying my invention; Fig. 2 is a central, vertical section of the diaphragm support and the parts carried thereby, the diaphragm being shown in end elevation; and Fig. 3 is a bottom plan view partly broken away of the device shown in Fig. 2.

In all of the views, like parts are designated by the same reference numerals.

Referring to the drawings, 1 represents the body of the recorder, and 2 the diaphragm support or casing, which latter is provided with an arm 3 pivoted at its outer end to the lower end of the arm 4 depending from the body 1. A weighted tube 5 rests at its lower end in the socket 6 of the

member 2 and forms a ball and socket joint therewith, the upper end of the said tube engaging the bore of the neck 7 of the body, as is common in devices of this character.

7' represents a stop for preventing displacement of the tube 5 from its socket in the member 2.

The diaphragm support 2 is provided with an annular flange 8 having a recess 9 extending circumferentially thereof and substantially parallel with the flat upper part 10 of the said support. Surrounding the diaphragm 11 in engagement with the edge or periphery thereof is a ring or gasket 12 of rubber or other yielding material provided with parallel annular flanges 13 and 14 extending over the opposite faces of the diaphragm. In securing the latter in position, the ring 12 is placed around the edge thereof; and the diaphragm with the ring attached thereto is then forced along the flange 8 until the ring becomes engaged in the recess 9, the cylindrical inner surface of the flange 8 permitting ready movement of the diaphragm into position. A washer 15 of paper or other suitable material is placed between the ring and the part 10 of the support 6. As the material of which the ring 12 is made is yielding, the diaphragm has a slight motion at its edge and, therefore, vibrates more freely than if it were rigidly secured in place.

For securing the stylus to the diaphragm, an inclined arm 16 secured to a support 17 which is fastened to the diaphragm substantially centrally thereof is provided. This support is preferably formed of sheet metal and is provided at its base with tabs 18 and 19 adapted to be passed through incisions in the diaphragm and to be bent over into engagement with the diaphragm to secure the support in place. The arm 16 extends into proximity to the edge of the diaphragm, and its outer end is engaged between the flange 14 and the diaphragm. By reason of this construction, the outer end of the arm is free to move with reference to the diaphragm, and the center of the latter is therefore freely movable with reference to its edges, whereby the diaphragm maintains a very high degree of sensitivity. Furthermore, with this construction, the thrust imparted by the stylus through the stylus arm to the periphery of the diaphragm is slight and does not appreciably

interfere with the free vibration of the diaphragm. A guard or stop 20 extends under the arm 16 preferably adjacent its outer end and is secured to the diaphragm in a manner similar to that employed for fastening the support 17 in place. This stop limits the movement of the arm away from the diaphragm. The stylus 21 is mounted in a tubular holder 22 which is secured in the inner end of the arm 16.

It will be seen that the ring or gasket 12 constitutes the sole means for securing the diaphragm 11 and a stylus arm 16 to the support 2. The diaphragm with the stylus arm and the ring 12 attached thereto may accordingly be secured to or removed from the support 2 by simply forcing the same by hand inwardly or outwardly along the flange 8.

Having now described my invention what I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. In a device of the class described, a diaphragm, a support, a stylus arm secured to the diaphragm substantially at the center thereof and extending into proximity to the edge thereof, and a member securing the diaphragm to the support and yieldingly pressing the outer extremity of the arm toward the diaphragm, substantially as described.

2. In a device of the class described, a diaphragm, a support, a stylus arm secured to the diaphragm substantially at the center thereof and extending into proximity to the edge thereof, and a ring of yielding material provided with annular flanges extending over the opposite faces of the diaphragm for securing the diaphragm to the support, the outer extremity of the stylus arm being located between one of the said flanges and the diaphragm, substantially as described.

3. In a device of the class described, a diaphragm, a support, a stylus arm arranged to cooperate with the diaphragm substantially at the center thereof and extending toward the edge thereof, and a ring of yielding material for securing the diaphragm to said support, said ring being provided with an annular flange extending over one face of the diaphragm and arranged to hold the outer extremity of the stylus arm in operative relation to the diaphragm, substantially as described.

4. In a device of the class described, a diaphragm, a support therefor, a stylus arm secured to said diaphragm at the center thereof, and a stylus mounted in said arm, said arm co-acting with the peripheral portion of said diaphragm to resist thrust on said stylus, and having a portion adjacent to the periphery of the diaphragm but movable relatively to said periphery during the

vibration of the diaphragm, substantially as described.

5. In a device of the class described, a diaphragm, a support therefor, a stylus arm secured to said diaphragm at the center thereof, and a stylus mounted in said arm, said arm co-acting with the peripheral portion of said diaphragm to resist thrust on said stylus, and having a portion adjacent to the periphery of the diaphragm but movable relatively to said periphery during the vibration of the diaphragm, and means yieldingly pressing said movable portion of said arm toward said diaphragm, substantially as described.

6. In a device of the class described, a diaphragm, a support therefor, a stylus arm secured to said diaphragm at the center thereof, and a stylus mounted in said arm, said arm co-acting with the peripheral portion of said diaphragm to resist thrust on said stylus, and having a portion adjacent to the periphery of the diaphragm, but movable relatively to said periphery during the vibration of the diaphragm, and a member securing said diaphragm to said support and yieldingly pressing said movable part of said arm toward said diaphragm, substantially as described.

7. In a device of the class described, a diaphragm, a support therefor, a stylus arm secured to said diaphragm at the center thereof, and a stylus mounted in said arm, said arm co-acting with the peripheral portion of said diaphragm to resist thrust on said stylus, and having a portion adjacent to the periphery of the diaphragm but movable relatively to said periphery during the vibration of the diaphragm, and a stop for limiting the movement of said arm away from said diaphragm, substantially as described.

8. In a device of the class described, a diaphragm, a support therefor, a stylus arm secured to said diaphragm at the center thereof, and a stylus mounted in said arm, said arm having a portion bearing against the peripheral portion of said diaphragm to resist thrust on said stylus, but movable relatively to said peripheral portion during the vibration of the diaphragm, substantially as described.

9. In a device of the class described, a diaphragm, a support therefor, a stylus arm secured to said diaphragm substantially at the center thereof and extending into proximity to the periphery thereof, and means formed of yielding material and carried by said diaphragm for securing said diaphragm to said support, said means having a flange extending over one face of said diaphragm and arranged to hold the outer extremity of said arm in operative relation to said diaphragm, substantially as described.

10. In a device of the class described, a

diaphragm, a support therefor, a stylus arm secured to said diaphragm substantially at the center thereof and extending into proximity to the periphery thereof, and a ring
5 securing said diaphragm to said support, said ring being provided with an annular flange of yielding material extending over one of the faces of said diaphragm and arranged to hold the outer extremity of said
10 arm in operative relation to said diaphragm, substantially as described.

11. In a device of the class described, the combination of a diaphragm, and a stylus arm secured to said diaphragm substantially
15 at the center thereof and extending toward the periphery of the diaphragm, a stylus on said arm, the outer portion of said arm co-acting with said diaphragm to resist thrust on said stylus but being movable relatively

to the diaphragm during the vibration of
the latter, substantially as described. 20

12. In a device of the class described, a diaphragm, a casing therefor formed to permit removal of the diaphragm without removal of parts of the casing, a stylus arm
25 carried by the diaphragm, and a resilient gasket mounted directly upon and carried by the diaphragm and engaging the casing, said gasket constituting the sole means for securing the diaphragm and stylus arm to
30 the casing, substantially as described.

This specification signed and witnessed this 15th day of February, 1911.

NEWMAN H. HOLLAND.

Witnesses:

FREDERICK BACHMANN,
ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents.
Washington, D. C."

GRAPHOPHONE PATENT.

SOUND REPRODUCING MACHINE,
1,187,892-----J. C. English,
Patented-June 20th, 1916.
Filed-August 14th, 1909.
Renewed-Nov. 7th, 1914.

J. C. ENGLISH.

SOUND REPRODUCING MACHINE.

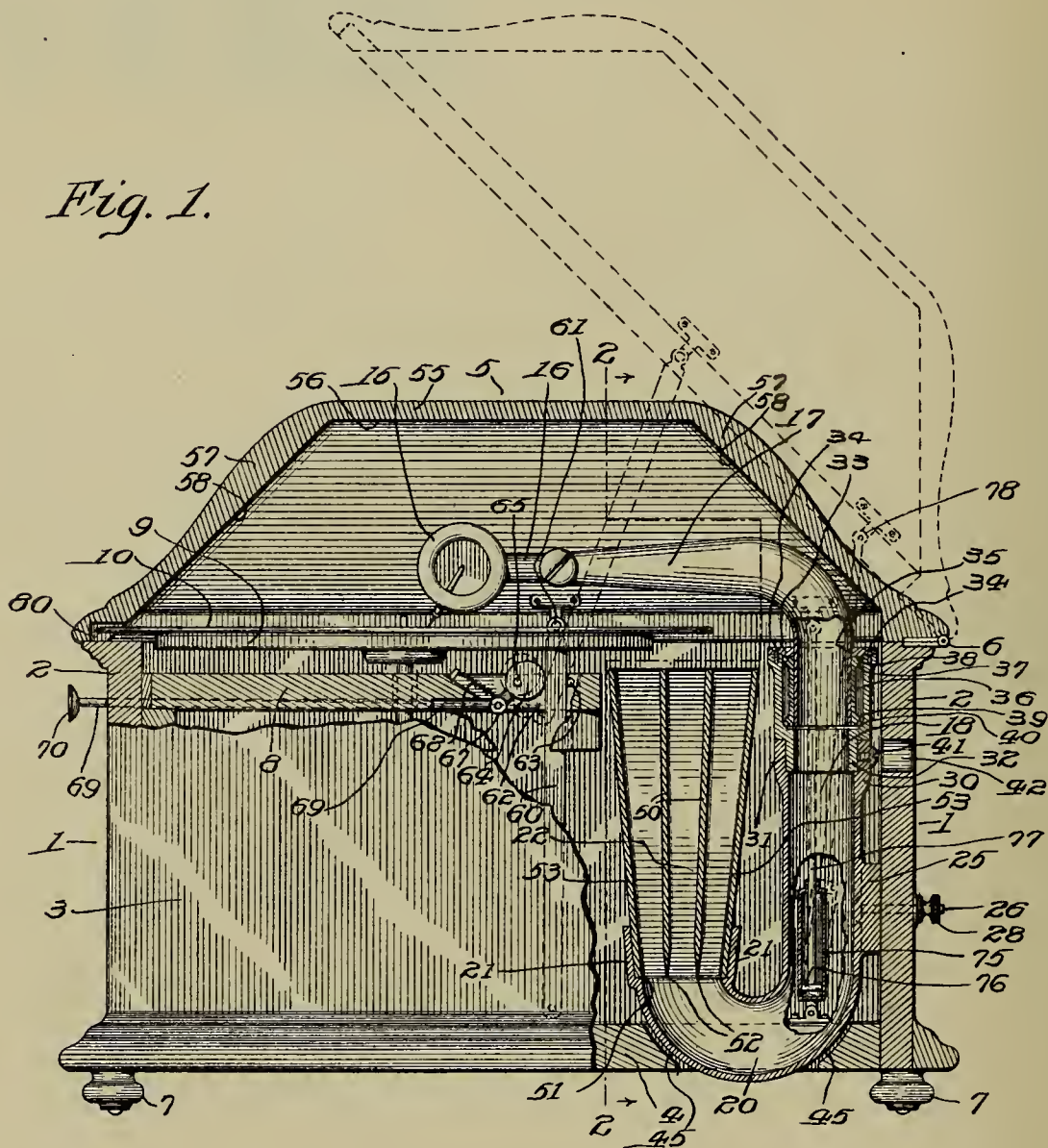
APPLICATION FILED AUG. 14, 1909. RENEWED NOV. 7, 1914.

1,187,892.

Patented June 20, 1916.

2 SHEETS—SHEET 1.

Fig. 1.



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A. J. Gardner.

BY

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John C. English.
Horace Felt.

ATTORNEY

J. C. ENGLISH.

SOUND REPRODUCING MACHINE.

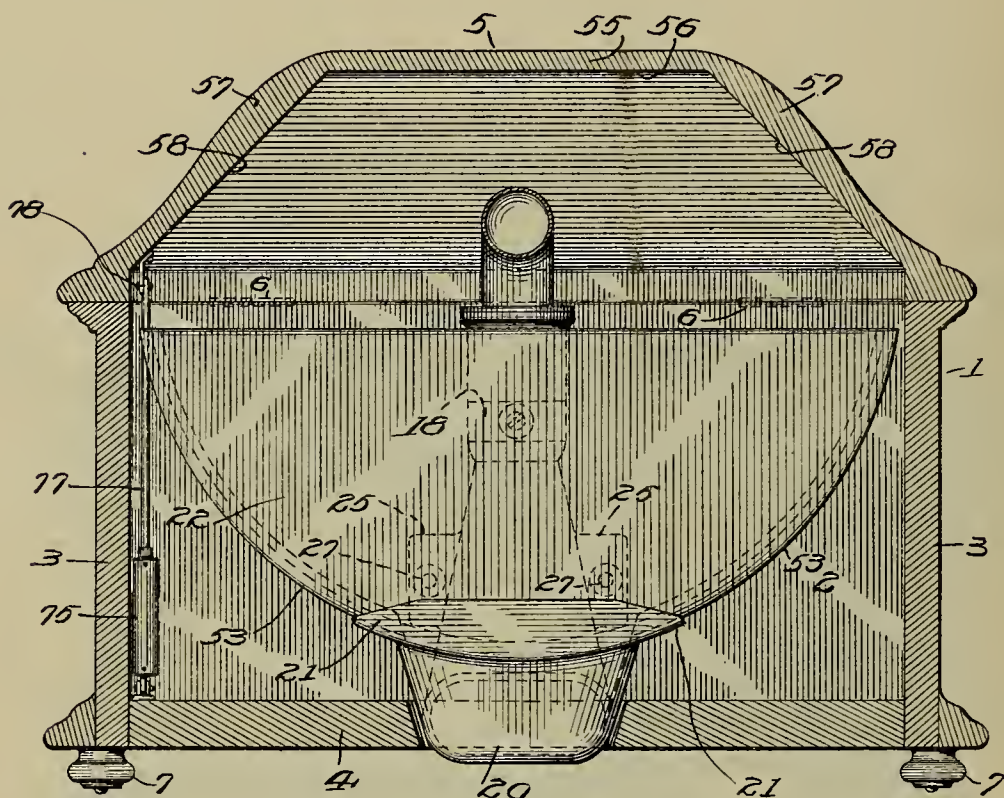
APPLICATION FILED AUG. 14, 1909. RENEWED NOV. 7, 1914.

1,187,892.

Patented June 20, 1916.

2 SHEETS—SHEET 2.

Fig. 2.



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WITNESSES

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A. J. Gardner.

BY

Harve Peltz.

ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-REPRODUCING MACHINE.

1,187,892.

Specification of Letters Patent.

Patented June 20, 1916.

Application filed August 14, 1909, Serial No. 512,845. Renewed November 7, 1914. Serial No. 870,939.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

The main objects of this invention are, to provide a compact talking machine having actuating mechanism, and sound reproducing and sound amplifying mechanism inclosed within a casing; to provide a talking machine having sound reproducing mechanism, and a sound amplifier inclosed in a casing having an improved adjustable cover arranged to receive the sound waves delivered from the sound amplifier and to deflect the same in any desired direction; to provide a talking machine having a record support mounted within a casing, sound reproducing means and sound amplifying means arranged to coöperate with the record support, and supported within the casing from the rear wall thereof, the sound amplifying means having a delivery end opening upwardly beneath the plane of the record support; to provide a talking machine having a casing provided with an adjustable cover and improved means for holding the cover in adjusted position; to provide a talking machine having a casing provided with a movable cover, and improved means for preventing the sudden closing of the cover; to provide a talking machine having a casing recessed internally to permit of the use of a relatively large record; and to provide other improvements as will appear hereinafter.

In the drawings, Figure 1 is a fragmentary side elevation partly in vertical section of a talking machine constructed in accordance with this invention; and Fig. 2 a transverse vertical section on line 2—2 of Fig. 1, looking in the direction of the arrows.

Referring to the drawings, one embodiment of this invention comprises a casing or cabinet consisting of a rectangular body portion 1, having front and rear walls 2, side walls 3, and bottom wall 4, and an adjustable cover 5, which is pivoted at its

rear edge to the upper rear edge of the rear end wall 2 of the body of the casing upon hinges 6. The body of the casing is preferably provided on its under side with suitable supports 7.

Within the body portion of the casing and near the top thereof is a horizontal removable partition 8, which forms a support for a turntable 9, which is adapted to carry the usual sound record 10. Beneath the horizontal partition 8 and carried thereby within the casing, is arranged suitable actuating mechanism for rotating the turntable. Although in the present instance, a turntable carrying a disk record is shown within the casing, it is obvious that any other form of record support carrying a suitable record might be used in applying this invention.

A sound box 15 or sound reproducing device of any well known construction, is mounted upon and communicates with a U-shaped tube 16, which is pivoted upon a horizontal axis 16, and communicates with the free end of a tapering tubular sound box arm 17, which extends rearwardly in a substantially horizontal direction, and the rear end of which is turned downwardly and is mounted in any suitable manner to swing upon a fixed vertical axis upon the upper end of a downwardly extending rigid tubular bracket 18, with which it communicates.

The tubular bracket 18 forms an intermediate section of a tapering sound amplifier, the inner section or inlet end of which is formed by the tapering sound box arm 17. The lower portion of the hollow bracket 18 is curved forwardly and then upwardly forming a return bend or elbow 20 and terminates in an upwardly extending flaring socket 21, adapted to receive the body portion 22 of the amplifier. The hollow bracket 18 may be substantially uniform in diameter measured in a direction parallel to the sides of the casing, flaring slightly toward the socket 21; but measured in a direction parallel to the rear of the casing, the bracket preferably flares or increases in diameter from its inner or upper end outwardly as shown in Fig. 2. The hollow bracket is preferably substantially cylindrical at its inner end, but it changes gradually to an oblong shape in cross section as it approaches the socket 21, which is preferably

rectangular and oblong in cross section, having its long diameter substantially parallel to the rear wall of the casing.

For securing the hollow bracket 18 rigidly in position, the bracket is provided upon its rear side, intermediate of its ends, with oppositely extending flattened projections 25, forming a base plate having a flat rear side which rests against the inner surface of the rear wall 2 of the casing, and is held in position by bolts 26 which pass through suitable apertures 27 provided therefor in the opposite sides of the base and in the rear wall of the casing, the bolts having heads integral therewith upon their inner ends, and nuts 28, threaded upon their outer ends outside of and in the rear of the casing. The nuts 28 are preferably provided with knurled heads for convenience of manipulation. Any other suitable means, however, obviously may be used, instead of or in addition to the means described for rigidly securing the bracket 18 to the rear wall 2 of the casing. In the construction shown the base plate formed by the projections 25 forms the sole support for the hollow bracket 18, which in turn forms the sole support for the swinging sound box arm at one end of the bracket, and the body portion 22 of the amplifier at the other end of the bracket in the socket 21, these parts being preferably out of contact with any part of the casing except through the base plate.

For rotatably connecting the downwardly extending end of the tubular sound box arm 17 to the upper end of the bracket 18, the upper end of the bracket is enlarged as at 30, and is provided with an internal cylindrical recess 31 opening upwardly. Within the cylindrical recess 31 fits the reduced lower end of a cylindrical head 32, to the upper end of which is secured a flat circular cover 33 by means of screws 34. The cover 33 is provided with a central circular aperture 35 within which rotatably fits the lower end of the sound box arm, the end of the sound box arm projecting downwardly within the head and into proximity to the lower reduced end thereof. The portion of the sound box arm within the head is surrounded by a sleeve 36, fixed thereon and provided adjacent each end thereof with an outwardly projecting annular flange 37, the upper flange forming with the internal surfaces of the cover and side wall of the head a race way for antifriction balls 38, and the lower flange forming with an internal annular shoulder 39 provided within the head, a race way for antifriction balls 40, whereby the sound box arm is rotatably supported. For holding the head 32 in position in the upper end of the bracket 18, a set screw 41 is threaded into the rear side of the upper enlarged end of the bracket and engages against the reduced portion of the head

within the bracket, the outer end of the screw being preferably provided with a slotted head adapted to be engaged by a screw-driver, and the rear wall of the casing being provided with an aperture 42 for the convenient insertion of the screw-driver for the adjustment of the screw from the outside of the casing.

To economize space, the bottom 4 of the casing is provided with an aperture 45 bounded by an inwardly flaring wall, and the elbow 20 of the hollow bracket 18 projects within this aperture, but preferably is out of contact with the flaring wall thereof, although very close thereto, to prevent the escape of sound waves between the elbow and the wall of the aperture.

The body 22 of the amplifier extends upwardly from the socket 21 at the lower end of the hollow bracket 18, and is entirely supported thereby, and comprises a series of upwardly extending flat sounding boards 50, substantially semi-circular in shape and having their curved edges inserted within the socket 21, and their straight edges arranged in a substantially horizontal plane, spaced slightly below the plane of the turntable and substantially in the plane of the upper surface of the horizontal partition 8. The rear edge of the horizontal partition 8 is spaced slightly in front of the upper end of the body of the amplifier to permit of the free vibration thereof.

The lower edges of the outer sounding boards of the body of the amplifier bear against circular internal shoulders 51 formed against the inner surfaces of the transverse sides of the socket. The inner surfaces of the hollow bracket adjacent the socket, and the inner surfaces of the outer sounding boards are flush with the adjacent inner surfaces of the bracket, and the intermediate sounding boards are sharpened at their lower edges as at 52, to avoid obstructing the passage of sound waves through the amplifier. The curved edges of the sounding boards are connected together by means of oppositely extending curved side pieces 53, each of which extends from within one side of the socket 21 to the upper straight edges of the sounding boards and forms a deflector for the sound waves passing through the amplifier. The body of the amplifier is preferably constructed so that the sounding boards diverge upwardly, although good results may be obtained when the sounding boards are substantially parallel.

The upper or delivery end of the body 22 of the amplifier is, in the construction shown, oblong and substantially rectangular in shape and has its long diameter substantially parallel with the back of the casing and extends substantially the full width of the interior of the casing, the body of the amplifier, however, being preferably out of

contact with any part of the casing, and unrestrained except at its lower end, where it engages in the socket.

The cover 5 of the casing comprises a top wall 55, having a flat inner surface 56, which is substantially horizontal when the cover is closed, and four downwardly flaring side walls 57 having flat inner surfaces 58, which are each arranged preferably at an angle of substantially 45 degrees with the inner surface of the top of the cover so that when the cover is opened to an angle of about 45 degrees with the top plane of the body of the casing, the inner surface of the front side of the cover will be substantially horizontal and the inner surface of the rear wall of the cover will be substantially vertical. The cover is thus constructed so that its inner surface may act effectively as a reflector to deflect forwardly the sound waves issuing upwardly from the delivery end of the amplifier and the particular shape shown for the inner surface of the cover is obviously only one of several shapes which are desirable for this purpose.

For holding the cover 5 in any desired position of angularity with respect to the body of the casing, a downwardly extending link 60 is pivoted at its upper end to the inner surface of one side of the cover as at 61, and the lower end of the link extends slidably through a suitable slot 62 provided therefor in one side of the horizontal partition 8 and bears slidably against the pin or lug 63, which projects from the horizontal partition and across the rear of the slot. A cam lever 64 is pivoted as at 65 intermediate its ends in a slot provided therefor in the horizontal partition 8 and in front of the link 60. The rear end of the lever normally engages slidably against the forward edge of the link and prevents the link from moving downwardly but does not offer any resistance to the upward movement of the link, and the other end 67 of the lever normally projects downwardly and forwardly in the slot, the lever being normally held in engagement with the link by means of a spiral spring 68 or other suitable yielding connection between the lower end 67 of the lever and one side of the casing or other fixed support. For moving the lower end of the cam lever inwardly to bring the other end of the cam lever out of engagement with the link 60, a push rod 69 is pivoted at one end to the lower end of the lever and extends forwardly therefrom in a substantially horizontal direction in a recess provided therefor upon the under side of the partition 8, and through the front wall of the casing, the outer end of the push rod projecting forwardly from the front side of the casing and being provided with a push button 70 for the convenient operation of the rod.

With this construction in mind, it is ob-

vious that to open the casing, it is simply necessary to raise the cover 5, and the same will be held automatically in any position to which it is moved, and that to close the casing it is simply necessary to push the button 70, whereupon the rod 69 will move the cam lever 64 out of engagement with the link 60, and the lever will then be free to fall into a closed position. The position of the cover 5 when open and the corresponding position of the cam lever 64 are shown in dotted lines in Fig. 1.

For preventing the cover from closing suddenly upon the body of the casing when released by the movement of the push button 70, a vertically arranged dash pot 75 of any suitable construction is located within the rear portion of the casing adjacent the bottom thereof, and is pivoted at its lower end to the upper surface of the bottom of the casing or other fixed support. This dash pot 75 carries the usual piston 76 mounted upon the end of a piston rod 77, and the upper end of the rod is pivotally connected through a bracket 78 to the rear portion of the inner surface of one side of the cover of the casing. When the cover is released from the elevated position the dash pot acts in a well known manner to permit the cover to fall gently into a closed position upon the body of the casing.

To adapt the machine to use a relatively large record, the turntable 9 may be arranged so that its upper surface is slightly above the upper surface of the body of the casing, and the turntable may be of such a diameter and so placed that the front portion of its peripheral edge is in close proximity to the inner surface of the front side of the casing, and so that the rear portion of its peripheral edge overhangs the front portion of the delivery end of the amplifier. To permit of the use of a record larger in diameter than the turntable, the lower edge of the front side of the cover is provided with an internal recess 80, adapted to receive the projecting edge of a record support when placed upon the turntable, the walls of the recess being out of contact with the record to permit of the free rotation of the record.

In the construction above described, the shape and arrangement of the amplifying means together with the unique construction of the casing makes it possible to provide a talking machine having an amplifier of relatively large proportions inclosed in a relatively shallow and compact casing, and moreover the improved form of the amplifier, particularly the form of the return bend or elbow of the intermediate or fixed portion of the amplifier, imparts an improved quality to the reproduction.

Although in the construction illustrated a tapering swinging sound box arm is shown, it is obvious that a cylindrical

sound box arm might be used instead of the tapering arm, and in this case, the sound box arm might not be considered as a portion of the amplifier, and the amplifier would then consist of the tapering tubular bracket 18 and the resonant body portion 22 carried thereby. It is also obvious that various other changes might be made in the construction illustrated, and that the improvements described herein might be used in various relations other than those shown, without departing from the spirit of this invention or the scope of the appended claims.

Having thus described my invention what I claim and desire to protect by Letters Patent of the United States is:

1. In a talking machine, the combination with a casing, of a record support in said casing, sound reproducing means mounted to cooperate with said record support and sound amplifying means communicating with said sound reproducing means and having a delivery end opening upwardly below said record support.

2. In a talking machine, the combination with a casing, sound reproducing means therein, a tubular sound conveyer communicating with said reproducing means and having a portion extending downwardly within said casing, the lower end of said sound conveyer being curved inwardly and then upwardly to form a return bend, and sound amplifying means communicating with said tubular conveyer and extending upwardly from the inner end of said return bend and discharging sound emitted therefrom upwardly and between said downwardly extending portion and said reproducing means, of a cover hinged to that side of said casing adjacent the discharge end of said amplifier to modify the sound waves discharged against it by said amplifier and direct said sound waves out of said machine.

3. In a talking machine, the combination with a casing, of a substantially horizontal disk record support mounted therein in the front portion thereof, sound reproducing means arranged above said support, and sound amplifying means within said casing and communicating with said sound reproducing means and secured to the rear wall of said casing, said sound amplifying means having a return bend or elbow having a portion extending downwardly from said reproducing means and then forwardly and terminating in an upwardly opening body arranged between said downwardly extending portion and said support.

4. In a talking machine, the combination with a casing, of a substantially horizontal disk record support arranged to rotate on a substantially vertical axis in the front portion of said casing, a tubular bracket

extending downwardly within the rear portion of said casing and fixed to the rear wall thereof, a sound box arm mounted to swing in a substantially horizontal plane upon the upper end of said bracket, a sound box carried by said sound box arm over said record support, and sound amplifying means communicating with said bracket and having an upwardly opening delivery end located in front of said bracket and between said bracket and the axis of rotation of said record support.

5. In a talking machine, the combination with sound reproducing means, a casing, and a rotary record support therein, of a non-vibratory tubular bracket communicating with said sound reproducing means and having a portion extending downwardly within said casing, the lower end of said bracket extending toward the axis of rotation of said record support and then upwardly forming a return bend and terminating in an upwardly opening socket, and vibratory sound amplifying means secured in said socket and extending upwardly therefrom.

6. In a talking machine, the combination with a casing, of a movable tone arm, of sound reproducing means carried by said tone arm, sound amplifying means within said casing and communicating with said tone arm and having a hollow delivery end opening toward said tone arm but spaced therefrom, and a rotary disk record support extending into the space between said delivery end and said tone arm.

7. In a talking machine, the combination of a casing, a rotary record support, sound reproducing means arranged to cooperate with said record support, and hollow sound amplifying means communicating with said reproducing means, a portion of said sound amplifying means being arranged to conduct sound downwardly from said sound reproducing means and a portion of said sound amplifying means being arranged to conduct and discharge sound upwardly from said first mentioned portion between said first mentioned portion and the axis of rotation of said record support, of a cover hinged to that edge of said casing adjacent the said downwardly extending portion of said sound amplifying means and cooperating with the discharge end of said upwardly extending portion to modify the sound emitted therefrom.

8. In a talking machine, the combination of a substantially horizontal disk record support, of sound reproducing means arranged above said support, and sound amplifying means communicating with said sound reproducing means, said sound amplifying means comprising a hollow non-vibratory member having a return bend or elbow having a portion extending down-

wardly from said reproducing means and then forwardly and a vibratory amplifying body terminating in an upwardly opening end and arranged between said downwardly
5 extending portion and said support.

9. In a talking machine, the combination with a substantially horizontal disk record support arranged to rotate upon a substantially vertical axis, of a tubular bracket
10 with a portion extending downwardly, and sound amplifying means having an upwardly opening delivery and communicating with the lower end of said downwardly extending portion and located between
15 said bracket and the axis of rotation of said record support.

10. In a talking machine, the combination with a casing, of a movable tone arm

inclosed thereby, sound reproducing means carried by said tone arm, hollow sound conveying means, sound amplifying means communicating with said tone arm through said sound conveying means and having a hollow fixed delivery end inclosed by said casing and opening toward said tone
20 arm, but spaced therefrom, and a rotary disk record support extending into the space between said delivery end and said tone arm.

In witness whereof I have hereunto set
my hand this 12th day of August 1909.

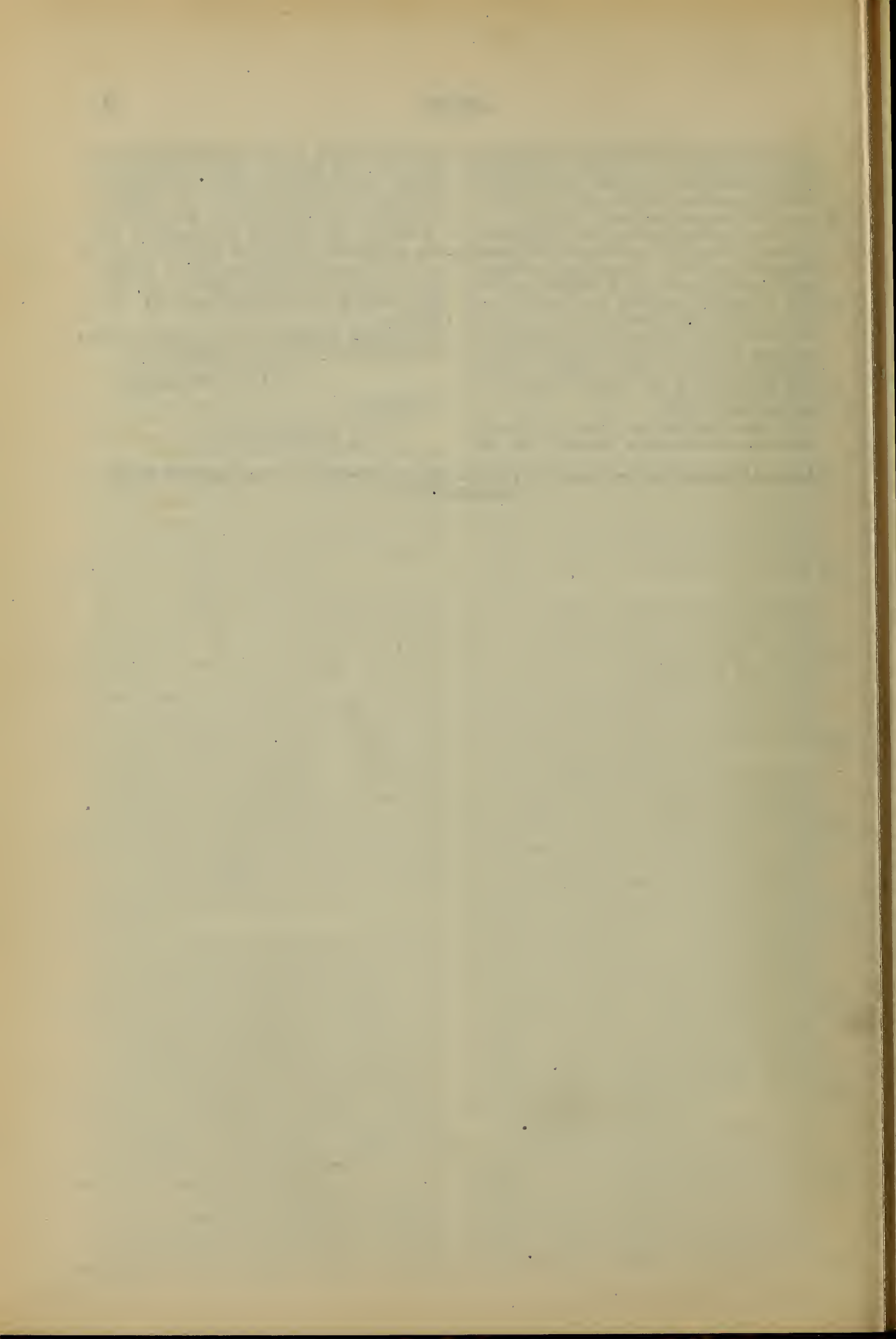
JOHN C. ENGLISH.

Witnesses:

EDWARD K. MACÉWAN,

FRANK B. MIDDLETON, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

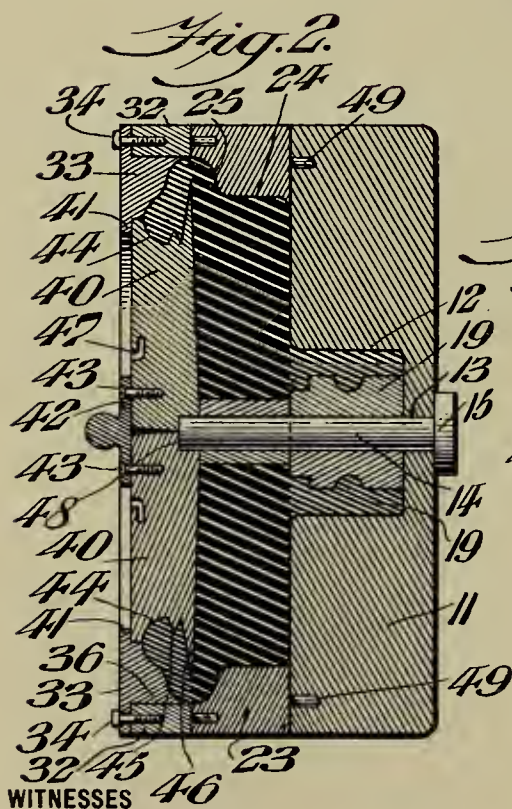


METHOD OF AND MOLD FOR MAKING
SOUND BOXES,

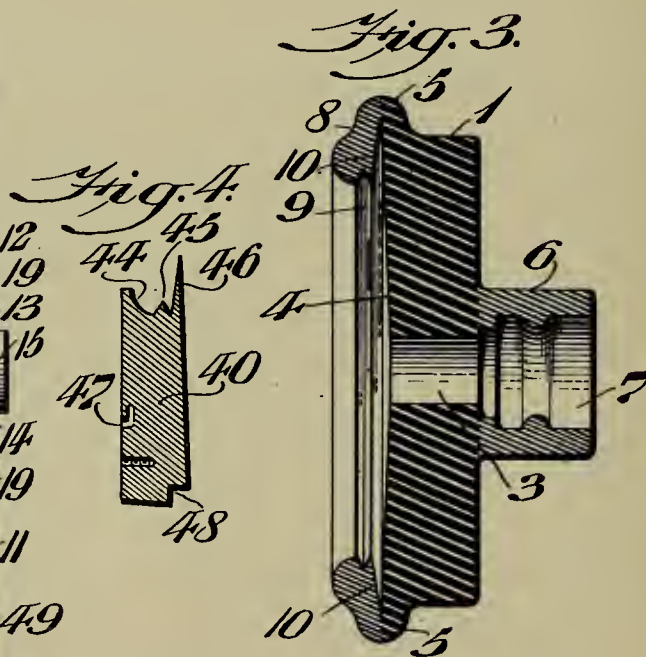
1,188,078-----A. D. Jones,
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METHOD OF AND MOLD FOR MAKING SOUND BOXES.
APPLICATION FILED JULY 20, 1914. RENEWED JAN. 26, 1916.

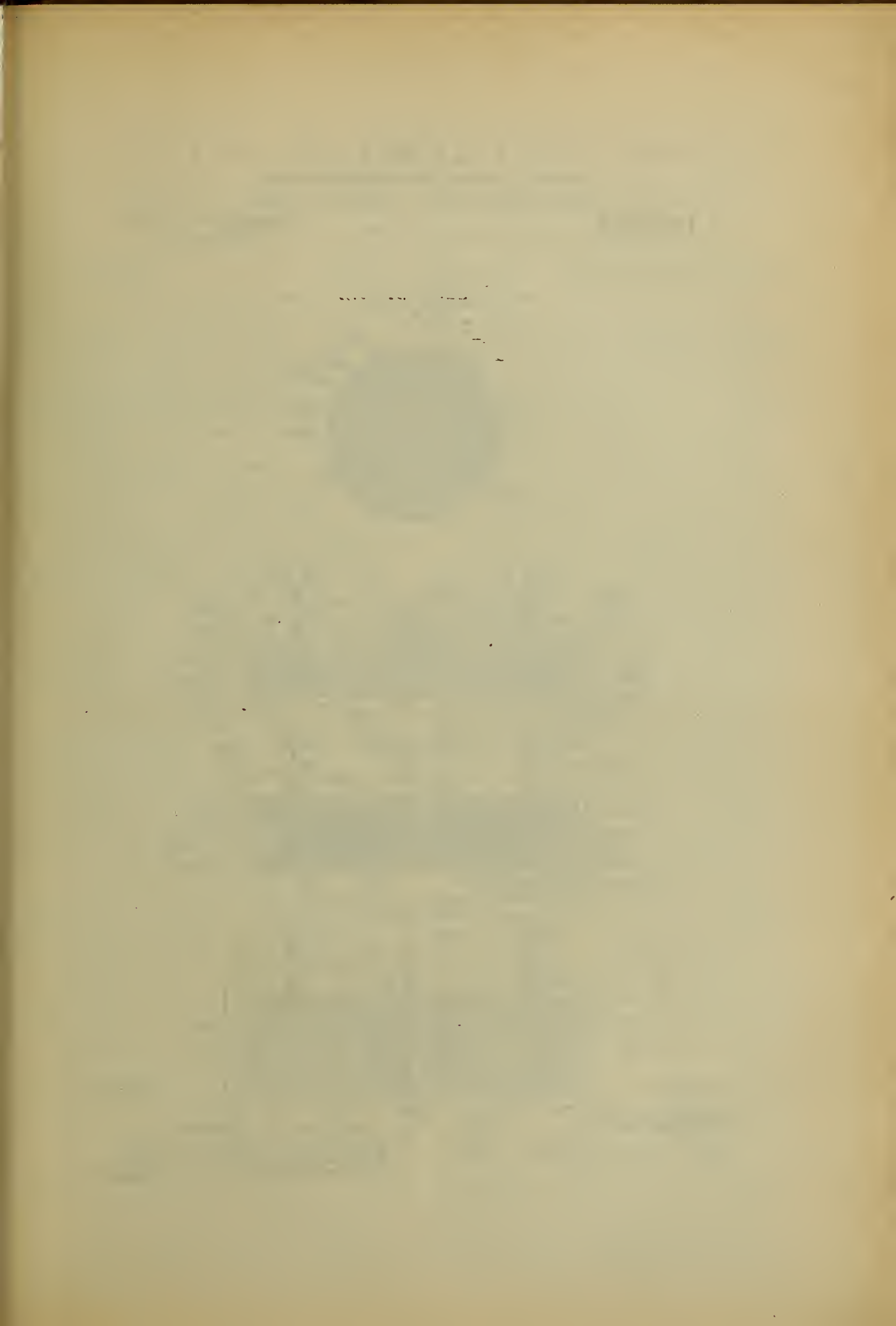
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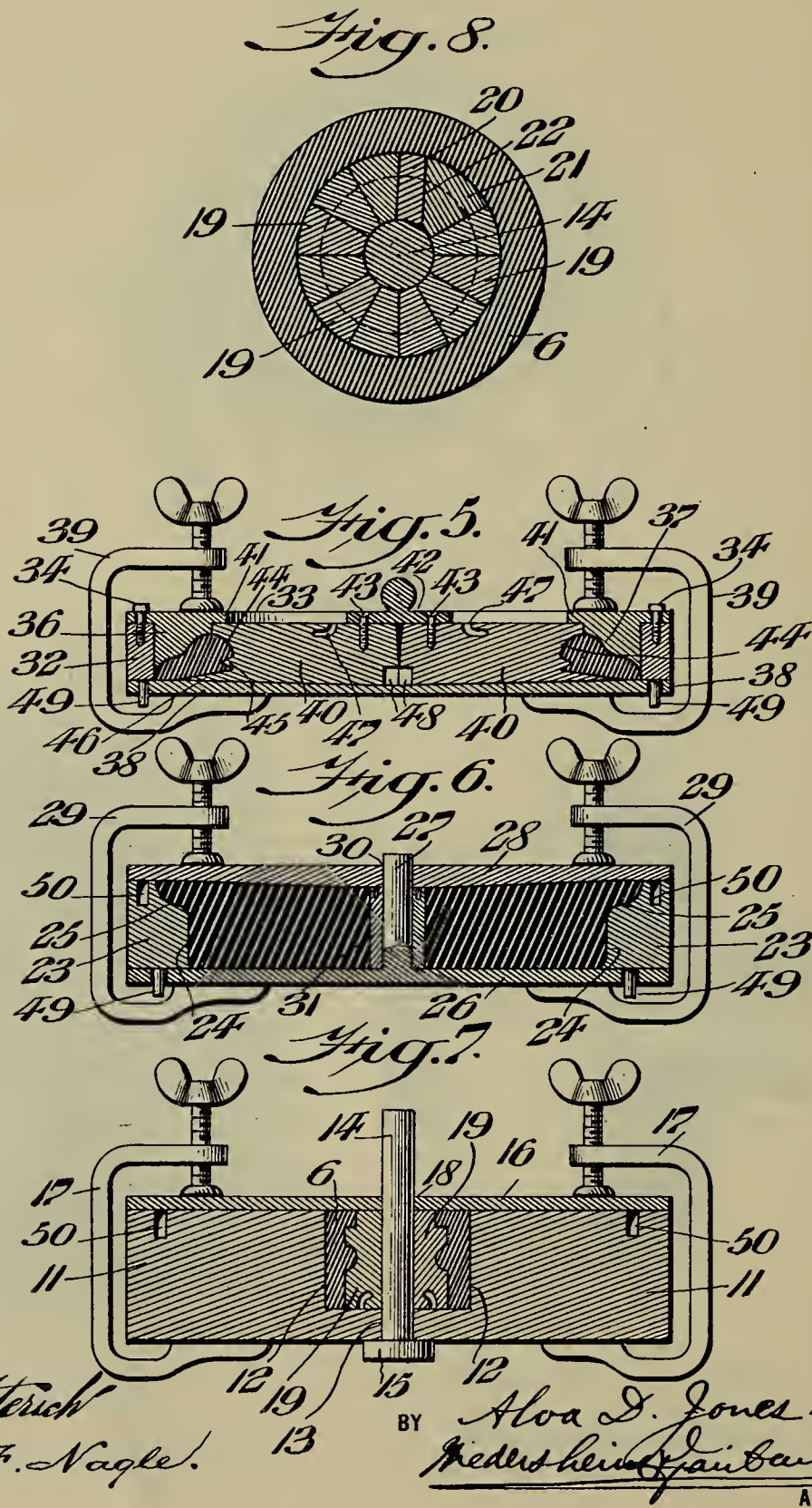


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UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA.

METHOD OF AND MOLD FOR MAKING SOUND-BOXES.

1,188,078.

Specification of Letters Patent.

Patented June 20, 1916.

Application filed July 20, 1914, Serial No. 851,873. Renewed January 26, 1916. Serial No. 74,477.

To all whom it may concern:

Be it known that I, ALVA D. JONES, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Method of and Mold for Making Sound-Boxes, of which the following is a specification.

My invention consists of an improved method of and mold for making an integral sound-box of a plastic material, such as rubber, for a talking machine or similar sound-recording, sound-transmitting, sound-reproducing or other acoustic transmitting or transforming apparatus, in which a vibratory diaphragm is employed.

It further consists of a mold-device in which the several parts of such a sound-box are formed from such plastic material, as rubber, and suitably cured, in separate mold-sections which can subsequently be united to unite and cure the several parts to form one integral box.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

The annexed drawings and the following description set forth in detail one mode of carrying out my method and one form of mold employed in carrying out such method, such mode and form of mold being illustrative of one manner in which my invention can be carried out.

In said annexed drawings Figure 1 represents a plan view of the mold embodying my invention. Fig. 2 represents an axial section of the complete finishing mold with the sound-box within it. Fig. 3 represents an axial section of the finished sound-box. Fig. 4 represents a sectional detail view of one of the sector-plates forming the outer closure for the mold. Fig. 5 represents an axial section of the mold-section for the rim or flange of the sound-box. Fig. 6 represents an axial section of the mold-section for the body of the sound-box. Fig. 7 represents an axial section of the mold-section for the neck of the sound-box. Fig. 8 represents a section, on a doubled scale, of the neck of the sound-box and the collapsible core in the same.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawing, and with particular attention to Fig. 3, which represents an axial section of the sound-box mold-

ed according to my invention, the reference numeral 1 indicates a cylindrical body, which is of hard rubber and formed with a central opening, 3, and with a dished recess, 4, which forms a part of the diaphragm recess and is surrounded by a peripheral bead or flange, 5. A neck, 6, of soft rubber is formed upon the center of the rear face of the body and has an axial bore, 7, registering with the central opening of the body, which bore is adapted to fit upon the tone-arm of the talking machine or other acoustic apparatus. A rim or bead, 8, is formed at the peripheral bead of the body to overhang the peripheral portion of the diaphragm-recess, and said rim is formed with an interior groove, 9, into which the periphery of a diaphragm can fit and be secured, and the inner face, 10, of the annular rim forms an overhanging annular wall of the diaphragm-recess. As stated, the body is of hard rubber and the neck and annular rim are of soft rubber, said parts being separately molded and cured and thereupon joined and cured or vulcanized together to form one integral sound-box. While rubber is the preferable material for the box, it is evident that other material possessing the general properties of rubber or its compounds, and capable of being vulcanized or cured to different degrees of hardness and to be integrally united can be used.

The mold is composed of three mold-sections which are first employed separately, as illustrated in Figs. 5, 6 and 7, to separately mold and vulcanize or cure the three component parts of the finished sound-box to the shapes and different hardness required, whereupon the main portions of said mold-sections and the parts therein are placed together, as illustrated in Fig. 2, and the parts joined and vulcanized or cured to form the integral box having parts of different consistencies.

The mold-section, 11, which molds the neck, is illustrated in Fig. 7 of the drawings, and is preferably cylindrical and formed with a central cylindrical mold-cavity, 12, which forms the outer side of the neck, and the outer end of which cavity is closed, with a central opening, 13, in such closed end in which fits a post, 14, having a head, 15, upon its outer end. A cover, 16, fits upon the face of the mold-section, being held in place by suitable clamps, 17, and covers the end of the mold-cavity, having

a central opening, 18, for the post. Truncate sector-shaped blocks, 19, are placed around the post to form with it a collapsible core for molding the bore in the neck, and a locking-block, 20, forming a part of said core has parallel sides and the block, 21, adjoining such locking-block has its side, 22, out of a radial plane and fitting against one side of the locking-block, so that on removing the post, said latter block can be moved inward out of engagement with the configurations of the bore of the neck, after the latter has been molded, and then endwise removed, when the remaining core-blocks may be collapsed and removed.

The mold-section, 23, which molds the body of the sound-box, is illustrated in Fig. 6 of the drawings, and has a large cylindrical mold-cavity, 24, enlarged at one side by an annular trough, 25, in which a part of the bead 5 of the body of the box is formed. A bottom-plate, 26, covers the open bottom of the mold-cavity and has a central post, 27, and a top-plate, 28, having a dished or convex inner side, covers the upper open top of the mold-cavity, said top and bottom plates and the mold-section being held together by clamps, 29. The post extends through an opening, 30, in the center of the top-plate, and a tubular core, 31, fits upon the post to form a portion of the bore in the neck, forming a continuation of the collapsible core of the neck-mold section.

The mold-section illustrated in Fig. 5 has an annular wall, 32, which forms a continuation of the wall of the body-mold section, and a ring, 33, is detachably secured to one edge of said wall by headed bolts, 34, upon the latter engaging keyhole slots, 35, in the ring. The ring has an annular molding, 36, upon its inner face, which fits within the wall and has annular concavities, 37, which mold the rounded outer side of the overhanging bead 8 of the diaphragm-recess of the sound-box. A bottom-plate, 38, is secured by clamps, 39, to cover the bottom of this mold-section, and the top of said section is covered by sector-plates, 40, having their peripheral edges engaging beneath an inwardly-extending flange, 41, extending from the inner edge of the ring. The apices of the sector-plates are detachably joined by a central plate, 42, secured to the plates by screws, 43, and the peripheral edges of the sector-plates are formed with a concave circumferential groove, 44, and a small-diameter V-shaped rib, 45, and a large diameter V-shaped rib, 46. The outer faces of the sector-plates have L-shaped recesses, 47, or otherwise shaped notches or depressions for the engagement of a pin or other tool for withdrawing the plates. The apices of the inner sides of the sector-plates have rabbets 48, forming a central recess when the plates are assembled, into which the end of the

axial post 14 engages when the entire mold is assembled.

In practice, the mold-sections are assembled and have their mold cavities filled with plastic rubber or whatever material is used, and are thereupon closed by the covers, which, being forced by the clamps, press the material into all parts of the mold-cavities. The filled mold-sections are now placed in suitable vulcanizers to vulcanize the material in the same to the required hardness, the body-portion being cured hard and the neck and rim-portion being cured soft. When the parts are sufficiently cured, the top-cover of the neck mold-section, the top and bottom-covers of the body mold-section, and the bottom-cover of the rim mold-section are removed and the three mold-sections superposed, dowel-pins, 49, and corresponding sockets, 50, as well as the axial post 14, bringing and retaining the sections in alinement. The surfaces of the portions of the box which are exposed by removal of the covers are suitably coated or treated to adhere to each other when the mold-sections are put together, whereupon the complete mold is placed in a vulcanizer and cured to weld the parts together into an integral whole while retaining the relative degrees of consistency or hardness required. The diaphragm cavity of the box will have comparatively hard walls to concentrate the sound-waves, while the soft support for the diaphragm and the soft connection of the box to the tone-arm will prevent all scratchy, rough, chattering or metallic taint of the sound vibrations. As, notwithstanding the different consistencies of the parts of the sound-box, the latter is one integral body of material, there will be no parting of joints or other disintegration of parts of the box. When the entire box is cured, the sector-plates are disconnected and removed, the annular ring and wall are removed from the body-section mold, and the post and the neck-section mold are removed. The collapsible core is collapsed and its blocks removed, and the small core is removed, and the body can be removed from its mold-section.

Other modes of applying the principle of my invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism thus disclosed, provided the principles of construction set forth respectively in the following claims are employed.

It will be seen from the foregoing that by my novel method and apparatus, I am enabled to make a sound box wherein the body portion is hard, and the diaphragm seat and rearwardly extending neck are somewhat softer, which I can attain by the hereindescribed method of semi-curing the body of the box, securing to the semi-cured

body an annular bead of softer material having a diaphragm seat therein, whereby an annular, resilient, integral hinge is formed, the body of said box having the rearwardly extending neck also of softer material, whereby a novel sound box having advantages over the prior art is produced.

So far as I am aware, I am the first in the art to produce a sound box of the character described out of rubber or similar material, having portions thereof of varying degrees of hardness, for the purpose stated, and my claims to my novel method and apparatus are to be construed with the corresponding scope awarded to a pioneer invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The herein described method of forming a sound box body which consists in separately molding a body portion and an outer diaphragm supporting portion, curing said portions to the desired degree of hardness, assembling said portions, and lastly uniting said portions by curing to form a completed sound box body, said diaphragm supporting portion being softer than said body.

2. The herein described novel method of forming a sound-box, which consists in separately molding a body-portion, a neck-portion and a diaphragm-supporting seat-portion, separately curing such portions to the desired consistency or hardness, assembling said several portions, and finally curing such portions to unite in one integral article.

3. The herein described novel method of forming a sound-box, which consists in separately molding portions of such box in separate mold-sections, separately curing such molded portions, each in its mold-section and to its required consistency or hardness, assembling said portions and their mold-sections with the joint surfaces of such portions in contact, and finally uniting such surfaces by curing to form such portions into one integral article.

4. The herein-described method of making a rubber sound box, which consists in semi-curing the body thereof, securing to said semi-cured body an annular bead of softer material, forming within said bead a diaphragm seat, and lastly completing the curing of said body and bead, said bead being semi-cured and said body fully cured and harder than said bead and diaphragm seat.

5. The herein-described method of making a sound box, which consists in semi-curing the body of said box, securing to said semi-cured body an annular bead of softer material having a diaphragm seat therein, and lastly completing the curing of said body and bead, whereby a sound box is produced having a body portion fully cured

and a diaphragm encircling portion semi-cured, the latter being softer than said body portion, and secured to said body portion by an annular, resilient, integral hinge.

6. The herein-described method of making a sound box of rubber or similar material, which consists in semi-curing the body thereof, securing to said semi-cured body an annular bead of softer material, forming intermediate said body and said bead a diaphragm seat, securing a rearwardly extending neck of softer material to said body portion, and lastly completing the curing of said body, bead and neck, said bead and neck being semi-cured and said body fully cured and harder than said bead, diaphragm seat and rearwardly extending neck.

7. The herein described method of making an integral sound box of rubber or the like which consists in curing a body portion and an outer diaphragm encircling portion to the desired degree of hardness and thereafter uniting said portions by curing to form a completed sound box body, said diaphragm encircling portion being softer than said body portion.

8. A mold for a sound box, comprising an annular wall, an annular ring detachably secured to said wall and having an annular molding extending within said wall, and a collapsible plate having its edges engaging said ring and forming with its edges and the annular molding of the same an annular mold cavity and formed with a peripheral rib upon said edge to mold a diaphragm groove.

9. A mold for a sound box, consisting of a body portion, formed with concentric cavities, a collapsible core axial in such cavities, a collapsible plate adapted to enter the open end of such cavity and having a circumferential rib upon its periphery, and a rim-forming ring adapted to be secured to the body-portion to bear against said plate and provided with an annular rim forming molding upon its inner side.

10. A mold for a sound box, comprising an annular wall, an annular ring secured to said wall and having an annular molding extending within said wall, and a collapsible sectional plate having its outer edges engaging said ring and forming with said annular molding an annular mold cavity for the diaphragm retaining portion of the sound box, the bottom of said plate having a central recess 48 therein.

11. A mold for a sound box body comprising a mold section 23, having an annular trough 25 therein, a bottom plate 26 having a central post 27, a top plate 28 and a tubular core 31 surrounding said post.

12. A mold for a sound box, comprising a mold section formed with a cavity closed at its bottom, open at its top and having

a central opening therethrough, a post located in said opening, a cover detachably secured to the face of said mold section, truncate sector shaped blocks surrounding
 5 said post and forming with the latter a collapsible core, and a locking block contacting with said sector shaped blocks.

13. A mold for a sound box, comprising a mold section for forming and containing
 10 the body portion of said box, a second mold section for forming and containing the diaphragm encircling portion of said box, detachable closures for covering the open sides of the mold cavities of said mold sections,
 15 and alining devices for enabling said mold section and their contents to be placed in juxtaposition after the removal of certain of said closures, so that the uniting of said portions to form an integral sound box may
 20 be effected.

14. A mold for a sound box, comprising a mold section for forming and containing the body portion of said box, a second mold section for forming and containing the
 25 softer diaphragm encircling portion of said box, detachable closures for said sections for enabling the contents of the latter to be cured to the requisite degree of hardness, and means common to said mold sections for
 30 enabling the latter and their contents to be placed in juxtaposition after the removal of certain of said closures, whereby the uniting and subsequent curing of said portions of said box may be effected.

35 15. In a mold for a sound box, means for separately molding portions of said box in separate mold sections, whereby such molded portions may be separately cured each in its mold section and to its required hardness, means for enabling said mold sections
 40 and their contents to be assembled, so that said portions of said sound box are in contact and in proper alinement, whereby said contacting juxtaposed portions are enabled
 45 to be united by curing to form an integral

sound box, whose body is harder than the diaphragm retaining portion.

16. A mold for a sound box, comprising two outer mold sections, for forming the softer diaphragm encircling member and
 50 the softer neck portion of the box, an intermediate mold section for forming the harder body portion of said box, detachable closures for said mold sections, and alining devices common to said mold sections for
 55 enabling the latter and their contents to be juxtaposed to form an integral sound box after the removal of certain of said closures.

17. A mold for a sound box, comprising 60 outer mold sections, for forming the outer portions of said box, an intermediate mold section for forming the harder body portion of said box, a collapsible sectional plate for one of said outer mold sections, and
 65 alining devices for retaining the mold sections in assembled position.

18. A mold for a sound box, comprising two outer mold sections, for forming the outer portions of said box, an intermediate 70 mold section for forming the harder body portion thereof, a collapsible sectional plate for one of said outer mold sections, a central alining device for said mold sections, having its end seated in said sectional plate, and
 75 outer alining devices for said mold sections.

19. The herein described method of forming a sound box body which consists in separately molding a body portion and an outer diaphragm supporting portion, curing said
 80 portions to the desired degree of hardness, assembling said portions, and lastly uniting said portions to form a completed sound box body, said diaphragm supporting portion being softer than said body.

ALVA D. JONES.

Witnesses:

E. HAYWARD FAIRBANKS,
 C. D. McVAY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPHOPHONE PATENT.

SOUND BOX FOR TALKING
MACHINES,

#1,188,079-----A. D. Jones,
Patented-June 20th, 1916.
Filed-Sept. 25th, 1914.

A. D. JONES.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED SEPT. 25, 1914.

1,188,079.

Patented June 20, 1916.

Fig. 1.

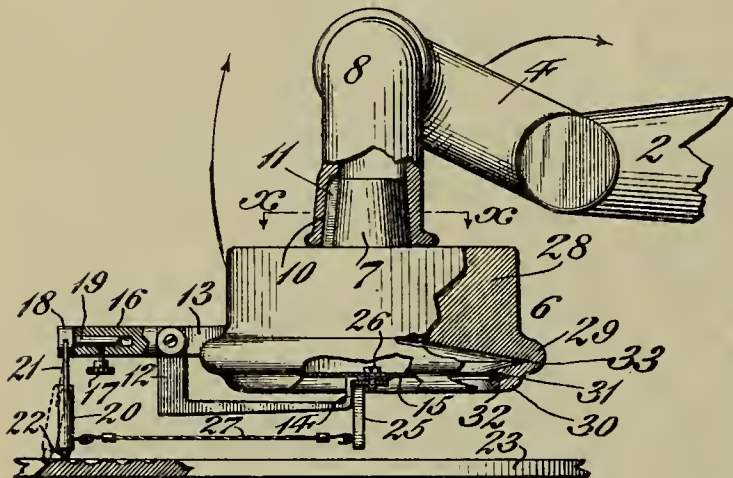


Fig. 4.

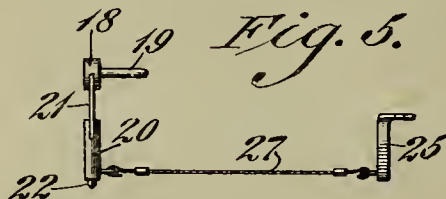
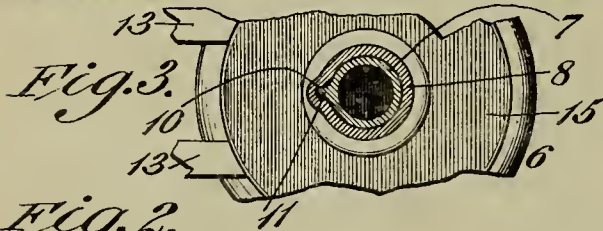
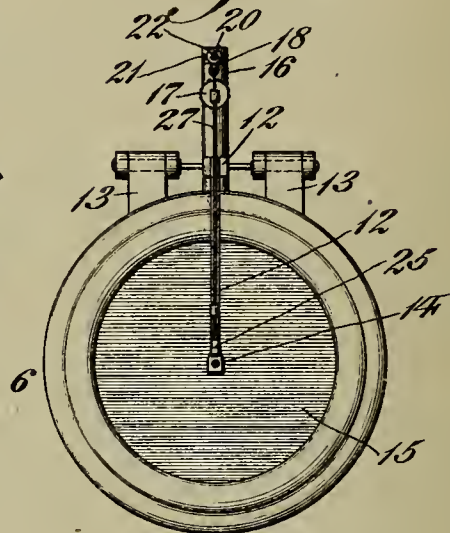


Fig. 5.

Fig. 2.

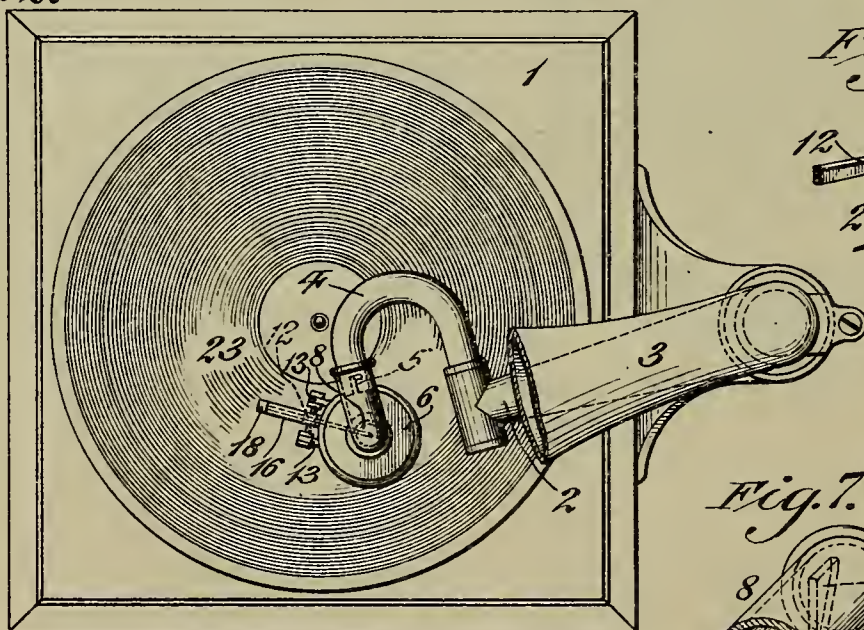


Fig. 6.

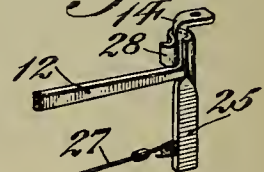
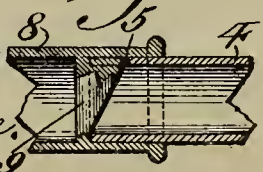


Fig. 7.



Fig. 8.



WITNESSES

L. Gouville,
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INVENTOR

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ATTORNEYS

UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO
JOHN S. LATTA, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

1,188,079.

Specification of Letters Patent.

Patented June 20, 1916.

Application filed September 25, 1914. Serial No. 863,434.

To all whom it may concern:

Be it known that I, ALVA D. JONES, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Sound-Box for Talking-Machines, of which the following is a specification.

My invention consists of an attachment for the sound-box in a talking machine by which such box constructed to be used with a record having its sound-groove laterally waved, such as a Victor or Columbia record, can be adapted to be employed with a record of the "hill and valley" type, such as employed in the "Edison" machine.

It further consists of means for supporting such sound-box in a horizontal plane instead of in a vertical plane from the tone-arm.

It further consists of means for attaching a tube-extension between the sound-box and the tone arm to present the former in the proper position to the record.

It further consists of means for preventing relative rotation of the box upon its support and the dislocation of the stylus.

It further consists of other novel features of construction; all as will be hereinafter fully set forth.

The annexed drawings and the following description set forth in detail one mechanical form embodying the invention, such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings—Figure 1 represents a side elevation of the end of the tone-arm, of a gooseneck and sound-box of a talking machine embodying my invention. Fig. 2 represents a plan view of a talking machine having my invention applied to it. Fig. 3 represents a section on the line $x-x$ in Fig. 1. Fig. 4 represents a plan view of the sound-box and stylus mechanism. Fig. 5 represents a detail view of the tone-intensifying elements. Fig. 6 represents a detail view of a detachable form of such elements. Fig. 7 represents a perspective detail view of the end of the gooseneck and of the sound-box tube, detached from each other. Fig. 8 represents an axial section of such parts when joined.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, the reference

numeral 1 indicates the frame of a talking machine of the "Victor" type, having a movable tone-arm, 2, and amplifying horn, 3, of such type of machine. A gooseneck, 4, is supported upon the end of the tone-arm, and the outer end of said gooseneck has the usual L-formed slot, 5, forming the usual bayonet joint. A sound-box, 6, has a neck, 7, fitting in one end of an angular tube, 8, the horizontal arm of which has a diametric bar, 9, which enters the longitudinal portion of the L-slot when the end of said tube is fitted upon the end of the gooseneck. The end of the vertical arm of the sound-box tube has a tapering outward crease or bulge, 10, which fits upon a tapering rib, 11, upon the neck of the sound-box. A doubly rectangularly bent stylus-bar, 12, is fulcrumed at one angle between ears, 13, upon the rim of the sound-box, and has its bent inner end, 14, secured to the center of the diaphragm, 15, of the sound-box. The outer arm of the stylus-bar has a socket, 16, in which the needle is secured by a clamping screw, 17, when the box is employed with a Victor or Columbia style record. A head, 18, has a pin, 19, which is inserted in the stylus-socket and clamped by the screw. A socket, 20, has its upper end connected to said head by a spring, 21, and the stylus-point, 22, for engaging the sound-groove in the record, 23, upon the turntable, is secured in the lower end of said socket. A stud, 25, is secured to the center of the diaphragm, usually by the rivet or screw, 26, securing the arm of the stylus-bar to said diaphragm, and a flexible and inelastic cord, 27, or similar connection is removably attached to said stud and to the stylus socket. Instead of being secured to the diaphragm by the rivet or screw, the stud can be formed with a spring-clamp, 28, at its upper end, which clamps the bent inner end of the stylus-bar and detachably secures such stud.

When a record of the "Edison" or "hill and valley" type is to be played in the machine, the sound-box is removed from the end of the gooseneck and the angular sound-box tube fitted upon the end of the gooseneck with the sound box neck in the downward arm of the tube and the diaphragm facing downward toward the record. The rib on the neck and the crease in the tube secure the sound-box in its proper position in relation to the record and tone-arm. The

stylus-needle employed for the laterally waving sound-groove of the Victor or Columbia record is removed from its socket and the pin of the head is inserted and secured in its stead and the stud is secured to the diaphragm, and the stylus-socket and said stud are connected by the flexible cord. The stylus-point engages the sound-groove in the record upon the turn-table and is vibrated as the latter is rotated, following rises and falls of the bottom of the spiral groove and thus vibrating the diaphragm through the rocking stylus-bar. As the stylus-point is tilted by the waving depths of the sound-groove in the record, the stylus-socket is tilted forward, as indicated on an exaggerated scale in the dotted lines in Fig. 1, and simultaneously imparts a slight vibratory movement to the stud upon the diaphragm through the flexible cord, whereby the vibrations of the diaphragm are augmented and the sounds of the same increased in volume.

The sound-box which is made in one piece of resilient material, such as rubber, has its rear wall, 28, of considerable thickness and such wall is composed of a comparatively hard body of rubber. The outer portion of the sound-box body is formed with a peripheral head, 29, and an annular head, 30, is formed on the face of the box and has an annular seat, 31, V-shaped in cross-section, formed in its inner side, in which seat the periphery, 32, of the diaphragm 15 is fitted. The rear wall or body of the box is formed from rubber vulcanized or similarly cured to considerable hardness, while the bead 30 and annular diaphragm seat are formed from considerably softer or semi-cured rubber, so that a resilient, annular and integral hinge, 33, is formed between the body and the annular bead 30. By this construction all scratchy, harsh or metallic sounds are absorbed in the body-portion which is preferably made of considerable thickness, and the soft annular diaphragm seat in the soft bead provides the requisite resiliency for the diaphragm, so that the latter can vibrate to the requisite extent at its periphery as well as at its center.

The sound-box is so secured in the downwardly extending branch of the bent tube upon the goose-neck that the stylus-arm extends at an acute angle to a radius of the record passing through the center of the sound-box, which position will have a tendency to exert a slight inward pull upon the stylus and box and insure the inward movement of the stylus and sound-box caused by the sound-groove in the record engaging the former.

By providing the bent tube secured upon the gooseneck and having the sound-box secured to the downwardly extending branch of such tube, the sound-box em-

ployed with the zig-zag grooved records and arranged vertically can be supported horizontally to operate with a record having a hill-and-valley groove, without change in the box or stylus arm, the only change necessary being the addition of the bent tube and the substitution of the stylus support for the ordinary pin-shaped stylus. The cord and stud may or may not be employed, although their employment is preferable owing to their increasing the strength of sound.

The transverse bar 9 in the joint of the sound-box tube and the gooseneck will prevent rotary motion in such joint, will brace the tubes at the slot, and the slight split or deviation caused in the tone-waves, passing through the tubes on both sides of the bar has a mellowing effect on the tones.

So far as I am aware, I am the first in the art to employ a sound box of the character described, composed of rubber or similar material, having portions thereof of varying degrees of hardness, for the purpose stated, in conjunction with an appliance for playing a hill-and-valley record, wherein means are provided for a general improvement of the tones, amelioration of the scratchy, metallic or grinding sounds common in instruments of this class, and provision made for a faithful development and reproduction of the delicate sounds ordinarily difficult to reproduce, which are reproduced by my novel device with a maximum degree of fidelity and faithfulness to the original, and my claims to my novel sound box and its adjuncts are to be construed with the corresponding scope accorded to a pioneer invention.

It will be understood that any suitable mounting for the stylus bar 12 may be employed other than that shown in Fig. 4, for the purpose of permitting the necessary motion to be imparted to said stylus bar, without departing from the spirit of my invention.

It will now be apparent that I have devised a novel and useful construction of a sound box for talking machines which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description and while I have, in the present instance, shown and described a preferred embodiment thereof which will be found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a device of the character stated, a

sound-box, a diaphragm therein, a stylus-bar fulcrumed upon said sound box and having its inner arm connected to said diaphragm and a socket in its outer arm, a
 5 stylus socket yieldingly supported upon said socket and having a stylus at its free end, a stud secured to said diaphragm, and a flexible and inelastic connection between said stud and stylus-socket.

10 2. In a device of the character stated, a sound-box, a diaphragm therein, a stylus-bar fulcrumed upon said box and having its inner arm connected to the center of the diaphragm and a socket in its outer arm, a
 15 stylus socket yieldingly supported upon said socket and having a stylus at its free end, a stud secured at the center of the diaphragm, and a flexible and inelastic connection secured to said stud and to the stylus-socket
 20 near the free end of the same.

3. In a device of the character stated, a sound-box, a diaphragm therein, a stylus-bar fulcrumed upon the periphery of said sound box and having a socket in its outer
 25 end and its inner arm secured to the diaphragm, a stylus-socket having a stylus in its end, a spring connecting said socket to the outer end of the stylus-bar, a stud supported on the diaphragm, and a flexible and
 30 inelastic cord-connection between said stud and the stylus-socket.

4. In a device of the character stated, a sound-box, a diaphragm therefor, a stylus-bar fulcrumed upon the periphery of said
 35 box and having a socket in its outer arm and the end of its inner arm secured to the center of the diaphragm, a stud secured at said center, a head secured with a pin in the socket of the stylus-bar, a stylus-socket hav-
 40 ing a stylus at its lower end, a spring secured to the upper end of said socket and to said head, and a flexible and inelastic cord connected to the stud upon the diaphragm and to near the free end of the stylus-
 45 socket.

5. In a device of the character stated, a sound tube formed with a longitudinal slot at the end thereof, a sound box, a diaphragm therein extending in a plane parallel to the
 50 record, an angular tube secured to said sound box and fitted on the slotted tube, and a flat diametrically disposed bar secured in an arm of said angular tube and engaging said slot in said sound tube, whereby an
 55 elongated bearing is provided at said slot in said sound tube.

6. In a device of the character stated, a sound-box, a diaphragm therein, a stylus-bar having its inner end secured to the dia-
 60 phragm, a stylus-socket movably supported upon the outer arm of said bar, a stud removably secured to the inner end of the stylus-bar, and a cord secured to said stud and to said stylus-socket.

65 7. In a device of the character stated,

a sound tube having a slot therein, an angular tube having its horizontal member provided with a flat transverse bar therein engaging said slot, whereby an elongated bearing is provided at said slot, and its vertical
 70 member flaring downwardly, a sound box having a neck on its rear wall projecting upwardly into engagement with said vertical member, and a diaphragm in said sound box standing in a horizontal plane and parallel
 75 to the record to be played.

8. In a device of the character stated, a one-piece sound-box body composed of resilient material having an annular face portion adapted to surround the periphery of a dia-
 80 phragm and softer than the other portions of said body, a horizontally extending diaphragm seated in such softer portion, and a stylus-bar fulcrumed upon said sound-box and having one arm connected to the
 85 diaphragm and provided at its other arm with a stylus-socket carrying a vertically disposed point, in combination with an angular tube for the exit of the sound waves from said sound box, the vertical member
 90 of said tube engaging said sound box and the horizontal member thereof communicating with a tone arm.

9. In a device of the character stated, a one-piece sound-box body composed of resilient material having an annular face portion adapted to surround the periphery of a diaphragm and softer than the other portions of said body, a horizontally extending
 95 diaphragm seated in such softer portion, means for supporting said box and diaphragm in a horizontal position, a stylus-bar fulcrumed upon said sound-box and having the end of its inner arm connected to the
 100 diaphragm, and a vertically disposed stylus-socket secured at one end to the outer arm of said stylus-bar and having a point at its other end.

10. In a device of the character stated, a sound-box body having a thickened rear
 110 wall and an annular peripheral bead at its face secured to said wall by an integral, annular and resilient hinge and formed with an annular diaphragm seat, a diaphragm supported with its periphery in
 115 said seat, a stylus-bar fulcrumed upon said sound-box and having the end of its inner arm connected to the diaphragm, and a stylus-socket flexibly secured at one end to the outer arm of said stylus-bar and having a
 120 point at its other end.

11. In a device of the character stated, a sound-box body having a thickened rear wall and an annular peripheral bead at its face of softer material than said body and formed
 125 with an annular internal diaphragm seat, said bead and its seat being integral with said body and being capable of vibrating independently of the same, a diaphragm having its periphery supported in said seat, 130

means for supporting said body and diaphragm in a horizontal plane and parallel to the record to be played, a stylus bar fulcrumed upon said body and having the end of its inner arm secured to said diaphragm, and a stylus-socket secured at one end to the end of the outer end of said stylus bar at a right angle to the same and having a stylus point at its other end.

12. In a device of the character stated, a sound-box, a diaphragm in such box, a stylus-bar fulcrumed upon said box and having its inner end secured to the diaphragm, and a stylus-socket secured at a right angle to the outer arm of said stylus-bar and having a stylus-point at its end, said sound box being made of one piece, and having a thickened, hardened body portion and an outer diaphragm seat of softer material secured to said body portion by an annular, integral, resilient hinge, in combination with a tone arm and means common to said tone arm and body for supporting said body and diaphragm in a horizontal plane.

13. In a device of the character stated, a sound-conveying tube supported to swing in a horizontal plane above the rotating record, an angular tube adapted to be fitted upon said tube and having a downwardly bent branch, a sound-box having a neck on its back fitted to said bent branch, said box having a hard body portion and an outer integral softer portion forming a diaphragm seat, a diaphragm in said seat, said box and diaphragm being supported in a horizontal plane, and a stylus-bar pivoted on said box and having one arm connected to the diaphragm of said sound-box and a stylus-socket on the other arm carrying a stylus and projecting to engage the record, at substantially a right angle to the latter.

14. In a device of the character stated, an angular tube having one member extending laterally and adapted to engage a portion of a tone arm, the other member of said tube depending vertically therefrom, a sound box supported from said depending member and having a horizontally extending body portion made of hardened rubber and an outer diaphragm inclosing portion of softer material secured to said body by an annular, integral, resilient hinge, a horizontally extending diaphragm carried by said body, a stylus bar supported on said body, a stylus socket depending from said bar at an angle thereto, and a stylus point in said socket.

15. In a device of the character stated, a tone arm adapted to swing in a horizontal plane above the rotatable record, a goose neck attached to said tone arm, an angular tube having one member secured to said goose neck and the other member depending therefrom, a sound box secured to said depending member and provided with a body

portion of hard, resilient material and an outer diaphragm inclosing portion of softer material secured to said body portion by an annular, integral, resilient hinge, a diaphragm carried by said body, the latter and said diaphragm being supported in a horizontal plane substantially parallel to said record, a stylus bar fulcrumed on said body, a stylus socket on said bar extending at substantially a right angle to said diaphragm and said record, and a stylus point in said socket.

16. In a device of the character stated, a sound box made in one piece, and having a thickened, hardened, resilient body portion, and an outer diaphragm seat of softer material secured to said body portion by an annular, integral, resilient hinge, a diaphragm in said seat, a stylus point supported from said body, at substantially a right angle to said diaphragm and pivotally mounted, means for supporting said box and diaphragm in a horizontal plane substantially parallel to the plane of rotation of the record to be played.

17. In a device of the character stated, a sound box made in one piece and having a hardened resilient body portion and an outer diaphragm seat of softer material secured to said body portion by an annular, integral, resilient hinge, a diaphragm mounted in said seat, and pivotally mounted means for supporting said box and diaphragm in a horizontal plane substantially parallel to the plane of rotation of the record to be played, in combination with a stylus bar fulcrumed on said body and a stylus socket depending from said bar at substantially a right angle to said diaphragm and record.

18. In a device of the character stated, a sound box made in one piece and having a hardened resilient body portion and an outer diaphragm seat of softer material secured to said body portion by an annular, integral, resilient hinge, a diaphragm mounted in said seat, and means for supporting said box and diaphragm in a horizontal plane substantially parallel to the plane of rotation of the record to be played, in combination with a stylus bar fulcrumed on said body, a stylus socket depending from said bar at substantially a right angle to said diaphragm and record and a stylus point in the end of said socket.

19. In a device of the character stated, a sound box made in one piece and having a hardened, resilient body portion and an outer diaphragm seat of softer material secured to said body portion by an annular, integral, resilient hinge, a diaphragm mounted in said seat, and means for supporting said box and diaphragm in a horizontal plane substantially parallel to the plane of rotation of the record to be played, in combination with a stylus bar fulcrumed

on said body, a stylus socket flexibly supported from said bar at substantially a right angle to said diaphragm and record, and a stylus point in the end of said socket.

5 20. In a device of the character stated, a tone arm, a sound box, a diaphragm in said sound box, means common to said tone arm and sound box for supporting said diaphragm in a horizontal plane, substantially
10 parallel to the plane of rotation of the record to be played, a stylus bar fulcrumed on said sound box, a stylus socket, a stylus point therein, and a flexible connection intermediate said stylus socket and stylus bar.

15 21. In a device of the character stated, a tone arm, a one piece sound box, having a

hardened resilient body portion, and an outer diaphragm seat encircling portion of softer material secured to said body portion by an annular, integral, resilient hinge, 20 a diaphragm within said seat portion, means common to said tone arm and sound box for supporting said box and diaphragm in a horizontal plane, a stylus bar fulcrumed to said body portion, a stylus socket and a 25 flexible connection intermediate said stylus socket and stylus bar.

ALVA D. JONES.

Witnesses:

C. D. McVAY,

H. M. LAFFERTY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

The first of these is the fact that the
 population of the country is increasing
 rapidly. This is due to a number of
 causes, the most important of which are
 the following:—
 1. The increase in the number of
 children born to each family.
 2. The decrease in the number of
 deaths, especially of infants and
 children.
 3. The immigration of people from
 other countries.

The second of these is the fact that the
 population is becoming more and more
 concentrated in the large cities. This is
 due to the fact that the large cities
 offer more opportunities for employment
 and for education than the small towns
 and villages. The third of these is the
 fact that the population is becoming
 more and more educated. This is due
 to the fact that the number of schools
 and colleges is increasing rapidly, and
 that the standard of education is
 becoming higher.

The fourth of these is the fact that the population is becoming more and more
 civilized. This is due to the fact that the people are becoming more and more
 acquainted with the principles of civilization, and are adopting them more and more
 fully.

The fifth of these is the fact that the population is becoming more and more
 healthy. This is due to the fact that the people are becoming more and more
 acquainted with the principles of health, and are adopting them more and more
 fully.

The sixth of these is the fact that the population is becoming more and more
 prosperous. This is due to the fact that the people are becoming more and more
 acquainted with the principles of prosperity, and are adopting them more and more
 fully.

The seventh of these is the fact that the population is becoming more and more
 united. This is due to the fact that the people are becoming more and more
 acquainted with the principles of unity, and are adopting them more and more
 fully.

The eighth of these is the fact that the population is becoming more and more
 happy. This is due to the fact that the people are becoming more and more
 acquainted with the principles of happiness, and are adopting them more and more
 fully.

The ninth of these is the fact that the population is becoming more and more
 virtuous. This is due to the fact that the people are becoming more and more
 acquainted with the principles of virtue, and are adopting them more and more
 fully.

The tenth of these is the fact that the population is becoming more and more
 wise. This is due to the fact that the people are becoming more and more
 acquainted with the principles of wisdom, and are adopting them more and more
 fully.

SOUND BOX FOR TALKING MACHINES,
#1,188,080-----A. D. Jones,
Patented-June 20th, 1916.
FILED-November 20th, 1914.

A. D. JONES.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED NOV. 20, 1914.

1,188,080.

Patented June 20, 1916.

Fig. 1.

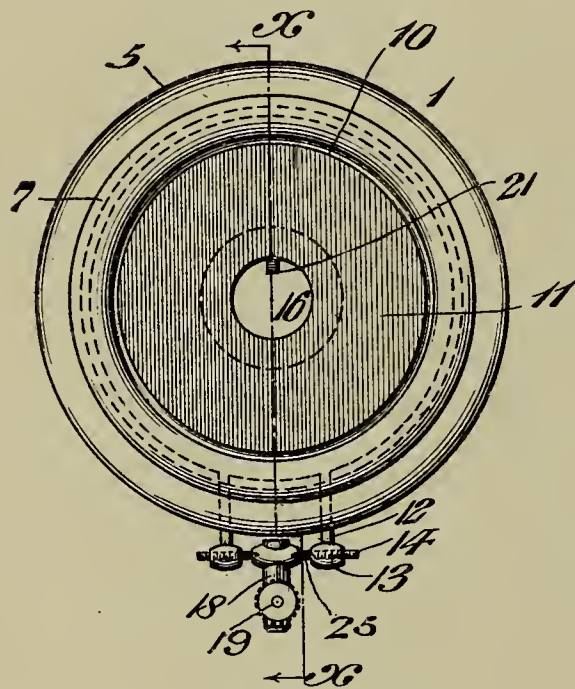


Fig. 2.

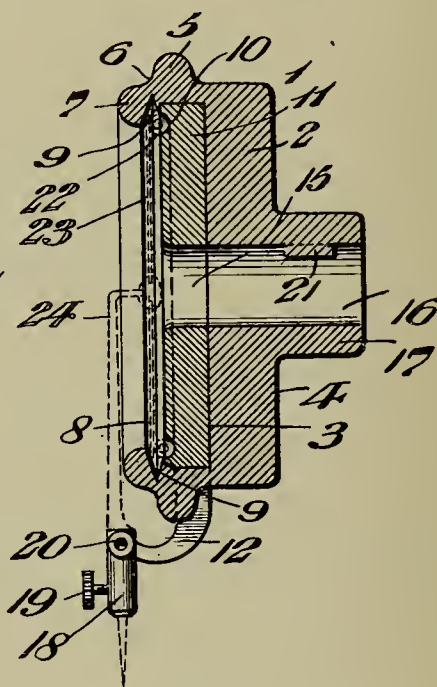


Fig. 4.

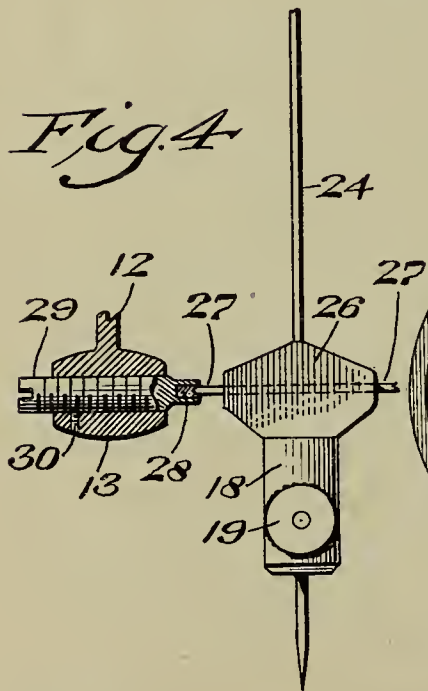
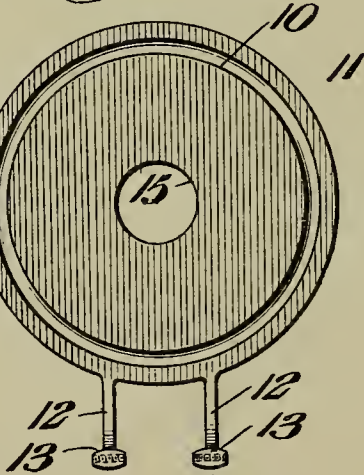


Fig. 3.



WITNESSES

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P. F. Nagle.

Alva D. Jones, INVENTOR
BY *Frederick J. Gault,*

ATTORNEYS

UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

1,188,080.

Specification of Letters Patent. Patented June 20, 1916.

Application filed November 20, 1914. Serial No. 873,205.

To all whom it may concern:

Be it known that I, ALVA D. JONES, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Sound-Box for Talking-Machines, of which the following is a specification.

In sound boxes for talking machines as generally constructed, the sound reproducing diaphragm is held in position by one or more detachable annuli of rubber or similar material, and the sound box is composed of a plurality of metallic and rubber parts united together by screws or the like, the various parts having rubber insulation between them, whereby the cost of production is greatly increased.

It is further well known that most sound boxes in use frequently emit a metallic or scratchy sound accompanying the reproduction of sound from the sound reproducing tablet. I have discovered as the result of an extensive series of experiments, that rubber when cured to the requisite degree so as to attain a degree of hardness or resonance simulating the condition of the human throat or palate, possesses many characteristics of the human throat when employed for a sound reproducing agent, and by constructing the entire sound box body of rubber and casting therein a preferably metallic member having preferably integral therewith bearings for the stylus arm and its adjuncts, and by mounting the diaphragm in a seat within a front annular bead, which is softer than the sound box body and is secured to said body by an annular resilient hinge, I have produced a device whereby the sound delivered from the diaphragm is greatly mellowed and improved, and a clear and distinct articulation is obtained.

In accordance with my present invention, I construct the entire sound box body of a single piece of rubber or similar material, which is produced by casting or molding, the main body portion of the box being preferably thickened and hardened, and having attached thereto by an annular, resilient, integral hinge, a front annular bead which overhangs and encircles the diaphragm seat, said bead being softer or semi-cured with reference to the sound box body, which latter is harder or cured to a harder degree than said front annular bead containing the diaphragm seat, and I also simulta-

neously cast within the hardened body portion of said box a metallic plate having a gasket receiving groove and projecting lugs for coöperation with the stylus bar and its adjuncts, whereby a device is cheaply produced having peculiar resonant qualities, and wherein any surface sounds or metallic or scratchy noises are eliminated or absorbed in the sound box body, the resultant device having peculiar resonant qualities which closely resemble the action of the human throat or palate in reproducing sounds.

By my novel invention, coupled with my novel manner of pivotally supporting the stylus arm and its adjuncts, I make provision for the diaphragm to be yieldingly supported, so that it has capacity for vibration adjacent to its perimeter as well as at its center, my novel sound box and its adjuncts being inexpensive to construct, extremely sensitive in action, easily and quickly repaired, and readily accessible for the purpose of inspection or replacement of parts, means thus being provided for a general improvement of the vocal or instrumental tones, amelioration of the surface noises as well as of the scratchy, metallic or grinding sounds common in instruments of this class, and provision being thus made for a faithful development and reproduction of the delicate sounds ordinarily difficult to reproduce, which are reproduced by my novel device with a maximum degree of fidelity and faithfulness to the original.

To the above ends, my invention consists of a novel construction of a sound box composed of rubber or similar material, wherein the body portion is thickened and cured to the requisite degree of hardness, said body portion having cast therein a plate, said body portion having also integral therewith or secured to the front portion thereof, an annular bead encircling and overhanging the diaphragm, the material of which said bead is composed being softer than said sound box body, whereby the requisite capacity for vibration of the diaphragm at its outer and intermediate portions is provided.

It further consists of a novel construction of sound box having a body of rubber or similar material which is fully cured so as to be in a hardened or resonant condition, and having a metallic plate cast therein to coact with the diaphragm, while the outer front portion of the box which encircles

and overhangs the diaphragm, as well as the rearwardly extending neck or attaching member, is softer than said sound box body. It further consists of a novel method of casting a sound box. For the purpose of illustrating my invention, I have shown in the accompanying drawing certain forms thereof which are at present preferred by me, since the same will give in practice satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as here shown and described.

Figure 1 represents a front elevation of a sound box embodying my invention. Fig. 2 represents a section on line $x-x$ Fig. 1. Fig. 3 represents a front elevation of the metallic plate and its lugs in detached position. Fig. 4 represents on an enlarged scale, a front elevation, partly in section, of the jewel bearing for the stylus bar.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings: 1 designates my novel construction of sound box, the same comprising the thickened body portion 2, which is contained within the walls 3 and 4, and is composed preferably of hard rubber or similar resilient or resonant material, said body portion having the peripheral bead 5 which at its forward portion is constructed to form the resilient annular wall or bead 7, within which is the inclined wall 8, which converges inwardly to meet the inclined wall 9. In proximity to said wall 9 is the annular groove 10, which is preferably located in the metallic plate 11, which is provided with lugs 12, having the bearings 13 therein for the oppositely located screws 14 or their equivalents, said plate having an opening 15 therethrough, which is in alinement with the bore 16 of the sound box, which is surrounded by the annular extension 17, which is softer than the sound box body 2.

18 designates the stylus holder or chuck, which is provided with the threaded screw 19, said chuck being open at its bottom portion to receive the stylus point of the usual construction, and having on opposite sides thereof, the pivot seats 20, which are adapted to be engaged by the pivot points 25 of the threaded screws 14. The inner portion of the extension 17 is provided with a lug 21, which is adapted to frictionally engage a coacting portion of the tube or tone arm to which the sound box is applied. The function of the annular groove 10 is to receive an annular gasket 22, whereby the diaphragm 23 is held in proper position between said gasket and the inclined wall 8.

The annular resilient hinge 6, as well as the outer wall or bead 7, are preferably integral with the bead 5 and the body portion 2, and both said bead 7 and said hinge 6 as well as the thickened portion of said bead 5, are all of softer material than the body 2, so that the diaphragm, whose outer periphery is held between said wall 8 and the gasket 22, is capable of the requisite amount of vibration at its outer as well as at its inner portions.

By the employment of the lug 21, I am enabled to dispense with the bayonet joint commonly employed to effect the interlocking of the rearward extension 17 with the tube or tone arm, (not shown), since it is only necessary to slip said extension 17 on said tube with the lug 21 in alinement with the slot of the tone arm, it being unnecessary to give any rotary movement to the body 2, whereupon the stylus and tablet of the usual construction will coact at the desired angle in the proper manner.

It will thus be seen from the foregoing that my novel sound box body is preferably composed of a single piece of material, as rubber or the like, formed with the body portion 2, which is cured hard or to such a degree of hardness as to approximate a condition simulating the human throat or palate, and with the annular hinge 6 and the front bead 7 which are softer or semi-cured, as is also the neck or extension 17.

By casting or molding the entire sound box of one piece of rubber or similar material, having the proper portions thereof semi-cured or softer than the other or hardened portions, as described, and by casting the metal plate 11 within the sound box body, during the manufacture thereof, as described, I am enabled to greatly reduce the cost of production and to dispense with the plurality of rubber and metallic parts, such as screws, nuts, knife edges and the like heretofore employed, and at the same time produce a device of superior quality.

By my method of casting in the sound box body the plate 11, I am enabled to both increase the weight of the box to the desired extent, and, in addition, to also produce a completed sound box body having the lugs thereon for the reception of the stylus bar and its adjuncts, it being apparent that any chatter, surface noises, scratchy or metallic sounds which may be transmitted through the lugs 12 to the sound box body, will be effectually absorbed in the hardened portion 2, and will not be transmitted to the sound conveying tube or horn, as will be evident to those skilled in the art, and a mellow and pleasing reproduction of delicate vocal as well as instrumental sounds, ordinarily difficult to reproduce, will be effected with a maximum degree of fidelity to the original.

I have deemed it unnecessary to describe

in detail the manner of securing the stylus bar 24 to the chuck 18 or to the diaphragm 23, as any approved means may be employed for effecting the assemblage of these devices.

5 In practice, the body portion 2, which comprises substantially the mass of material between the walls 3 and 4 in my method of molding or casting my novel sound box, may be at first semi-cured, during which action
10 the metallic plate 11 may be placed in position and thereafter, the annular bead or ring 7 which may be first shaped independently of the sound box body 2 with or without the diaphragm therein, can be united with the
15 contiguous portion of the bead 5, after which the curing of the mass of rubber may be completed, the body portion 2 of the box being then completely cured, while the front, annular peripheral bead 7 will be semi-cured
20 so that the desired degree of comparative softness and hardness as regards the front bead 7 and the sound box body 2 can be readily attained by those skilled in the art, the arms 12 being securely embedded in the
25 sound box body at the points where they extend therethrough, so that any undue or improper vibrations of said arms will be taken up in said body portion, as will be evident.

30 It will be apparent that the molding or casting of the sound box 7 in its entirety with the metallic plate and integral arms 12 thereon, may be effected in various other ways than that described, and inasmuch as
35 I am the first in the art to produce a sound box of the character described, having a diaphragm retaining portion of soft material, which is secured to the integral body portion of harder material by a resilient, annular
40 hinge, in conjunction with the metallic plate cast therein, for the purpose stated. I reserve the right to make all such changes as will come within the spirit of my invention or the scope of the appended claims.

45 It will be seen from the foregoing that by my novel method, I am enabled to make a sound box by casting from rubber or similar material, wherein the body portion is hard and has cast therein the plate 11, provided
50 with the annular groove 10 and the arms 12 provided with the bearings 13 adapted to coact with a stylus bar, it being also apparent that the front bead 7 containing the diaphragm seat, as well as the extension 17, are
55 somewhat softer than the body portion, which product I can attain by the herein described method of semi-curing the body of the box, casting within said body said plate, and then securing to the semi-cured body the
60 annular bead of softer material having a diaphragm seat therein, it being understood by those skilled in the art that a further or subsequent curing takes place incident to the union of the semicured body and said annular
35 bead, whereby a concrete unitary

structure is produced having advantages over the prior art.

So far as I am aware, I am the first in the art to employ the method hereinabove described, and to produce a sound box of the
70 character described out of rubber or similar material, having the resonant metallic plate 11 cast therein, and having portions of said box body of varying degrees of hardness, for the purpose stated, and my claims for
75 my novel method and product are to be construed with the corresponding scope awarded to a pioneer invention.

It will be apparent that while I have described the material of which my sound box
80 body is composed as being preferably of rubber, I do not desire to be limited thereto in every instance, but claim broadly my method and product as applied to the use of any plastic material having properties similar to
85 rubber or its equivalent.

I have deemed it unnecessary to describe with great particularity the process or mode of curing of my novel sound box body, as
90 this will be readily understood by those skilled in the art, by reference to my prior Patent #1,118,653, granted November 24th, 1914, for a sound box for talking machines.

In Fig. 4, I have shown a preferred form of mounting the stylus bar in jewel bearings, whereby the life of the pivot points
95 will be indefinitely prolonged, and the recording or reproducing features of the device will be greatly enhanced. In carrying out this feature of my invention, I bore the
100 head or upper portion 26 of the stylus chuck transversely, and insert therein a pivot bearing 27, which is staked in said head or otherwise rigidly and immovably secured therein, the outer terminals of said member
105 27 being pointed and adapted to engage a jewel bearing 28, which is contained in the extremity of the threaded stem or screw 29, which latter is in threaded engagement with the lug or bearing 13 of the arm 12.
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In order to give the threaded stem a neat and attractive appearance, I preferably reduce the diameter of the same around the
115 jewel bearing, as will be understood from Fig. 4, and in order to hold said stem 29 rigidly or immovably in position, I employ the screw 30 seen in the lower left hand portion of said Fig. 4.

It will be apparent that the construction on each side of the head 26 will be identical,
120 so that a description of one side will suffice for both.

In prior devices with which I am familiar, wherein knife edges or the like are employed, it will be evident to those skilled
125 in the art, that when such knife edge becomes worn or has worn the seat in which it rests, a certain amount of lost motion must inevitably take place, which is very harmful to the recording or reproduction of
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vocal or instrumental sounds. In my device, however, when the parts are assembled as seen in Fig. 4, there is little possibility under any conditions for such lost motion and the life of my novel device will therefore be indefinitely prolonged. The jewel bearing 28 may be composed of any suitable material, such as sapphire, agate or any other similar hard and imperishable substance.

It will be understood that if desired, in some instances, the jewel bearing may be dispensed with and the end of the threaded stem 29 hardened by any suitable means.

It will now be apparent that I have devised a novel and useful construction of a sound box for talking machines, which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have, in the present instance, shown and described a preferred embodiment thereof which will give in practice satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars, without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The method of making a rubber sound box, which consists in semi-curing the body thereof, securing within said body, a plate, securing to said body an annular bead of softer rubber encircling a diaphragm seat, and lastly completing the curing of said body.

2. The method of making a rubber sound box, which consists in semi-curing the body thereof, casting within said body a plate, securing to said semi-cured body an annular bead of softer rubber encircling a diaphragm seat, and lastly completing the curing of said body and bead, said bead being semi-cured and said body fully cured and harder than said bead and diaphragm seat.

3. The herein described method of making a sound box from plastic material, which consists in semi-curing the body thereof, casting within said body a metallic plate, securing to said semi-cured body an annular bead of softer material, having an inner wall to serve as a diaphragm seat, and lastly completing the curing of said body and bead, said bead being semi-cured and said body fully cured and harder than said bead and diaphragm seat.

4. The herein described method of making a sound box, which consists in semi-curing the body thereof, casting within said body a metallic plate having an annular groove therein, and provided with projecting arms, securing to said semi-cured body an annular bead of softer material having an inclined wall therein adapted to form a portion of a diaphragm seat, and lastly com-

pleting the curing of said body and bead, whereby a sound box body is produced having a hardened body portion fully cured and a diaphragm seat portion softer than said body and semi-cured.

5. The herein described method of making a sound box body of rubber or similar material, which consists in semi-curing the body thereof, casting within said body a metallic plate, securing to said semi-cured body an annular bead of softer material, having an inner inclined wall serving as a portion of a diaphragm seat, securing a rearward extension of softer material to said body portion, and lastly completing the curing of said body, bead and extension, said bead and extension being semi-cured and said body fully cured and harder than said bead, diaphragm seat and rearwardly extending neck.

6. As an improved article of manufacture, a sound box body composed of relatively hard rubber, the front annular portion of which is adapted to surround the periphery of a diaphragm and is softer than the adjacent juxtaposed portion of said sound box body, and a plate having an opening there-through secured in said hardened body portion.

7. As an improved article of manufacture, a sound box body composed of resilient resonant material, the front annular portion of which is adapted to surround the periphery of a diaphragm, and is softer than the other portions of said sound box body, and a metallic plate cast in said body, and provided with arms projecting through said body and adapted to receive bearings for a stylus bar.

8. As an improved article of manufacture, a sound box body having a thickened rear wall of resilient, resonant material, and a front annular bead secured to said wall by an annular, integral, resilient hinge, said bead being capable of vibration independently of said body portion and encircling a diaphragm seat, and a metallic plate cast in said body portion, and provided with an annular groove located oppositely to said bead, said plate having arms thereon extending beyond said body portion and adapted to co-act with a stylus bar.

9. As an improved article of manufacture, a sound box body having a thickened rear wall of hardened, resilient, resonant material and a front, annular, peripheral bead secured to said wall by an annular, resilient hinge, said bead being capable of vibration independently of said body portion and encircling a diaphragm seat, a metallic plate cast within said body portion and having an outer, annular groove oppositely located to said bead, and a rearward extension from said body portion composed of material softer than said body portion.

10. The combination of a diaphragm, a

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sound box body having a rear wall of hardened, resilient, resonant material, and a front, annular bead secured to said wall by an annular, resilient hinge, said bead being
5 capable of vibration independently of said body portion, and encircling said diaphragm, a plate cast within said body and having an outer, annular groove oppositely located to said bead, arms on said plate projecting through said body portion and
10 adapted to coact with a stylus bar, and a gasket intermediate said groove and diaphragm.

11. As an improved article of manufacture, a sound box body composed of resilient, resonant material, and having a diaphragm seat therein, and a metallic plate
15 secured in said body and provided with arms projecting through said body and adapted to receive bearings for a stylus bar.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND REPRODUCING MACHINE,
#1,188,374-----J. C. English,
Patented-June 20th, 1916.
Filed-August 14th, 1909.
Renewed-May 7th, 1915.

J. C. ENGLISH.

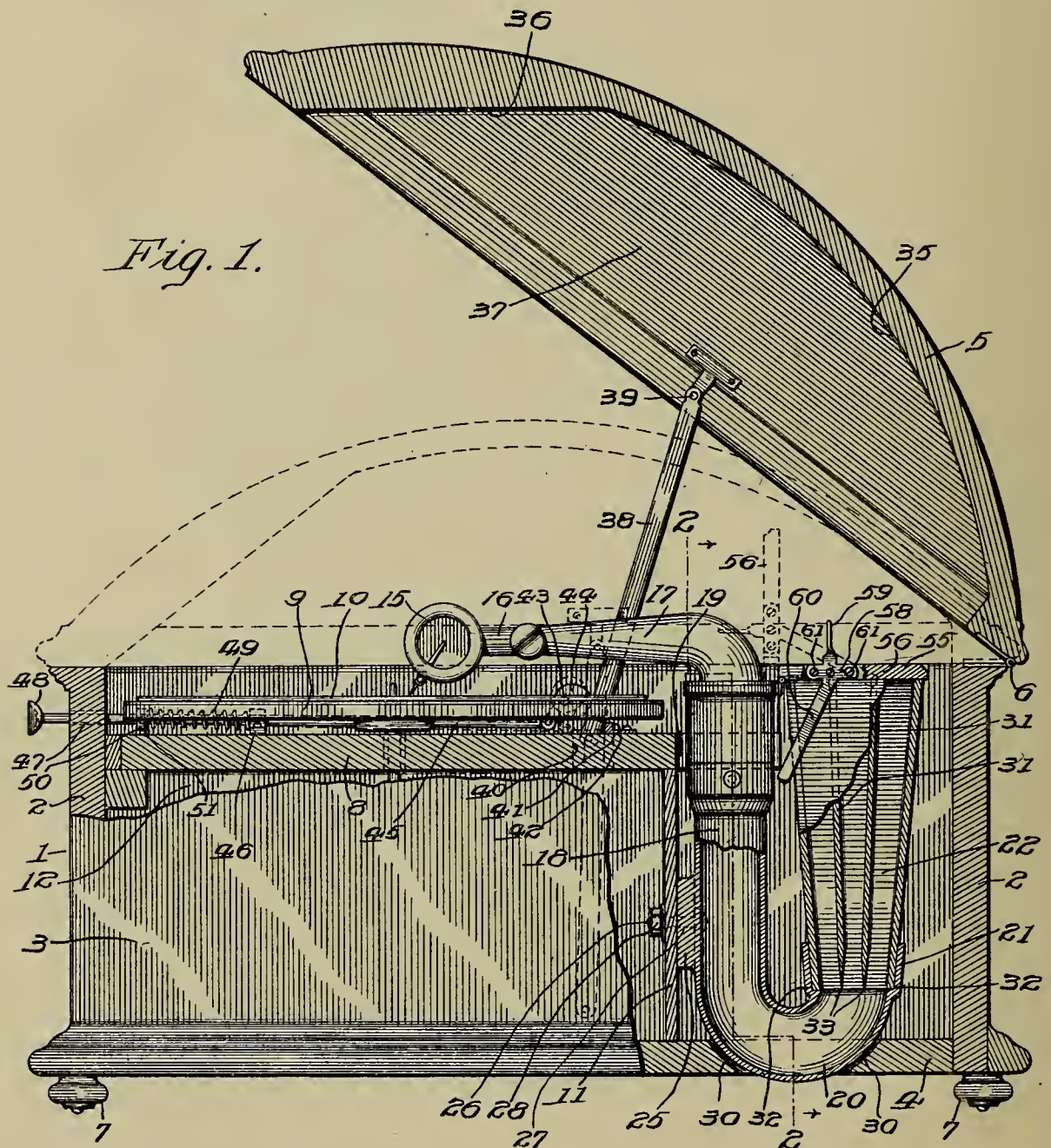
SOUND REPRODUCING MACHINE.

APPLICATION FILED AUG. 14, 1909. RENEWED MAY 7, 1915.

1,188,374.

Patented June 20, 1916.

2 SHEETS—SHEET 1.



INVENTOR

John C. English.

WITNESSES

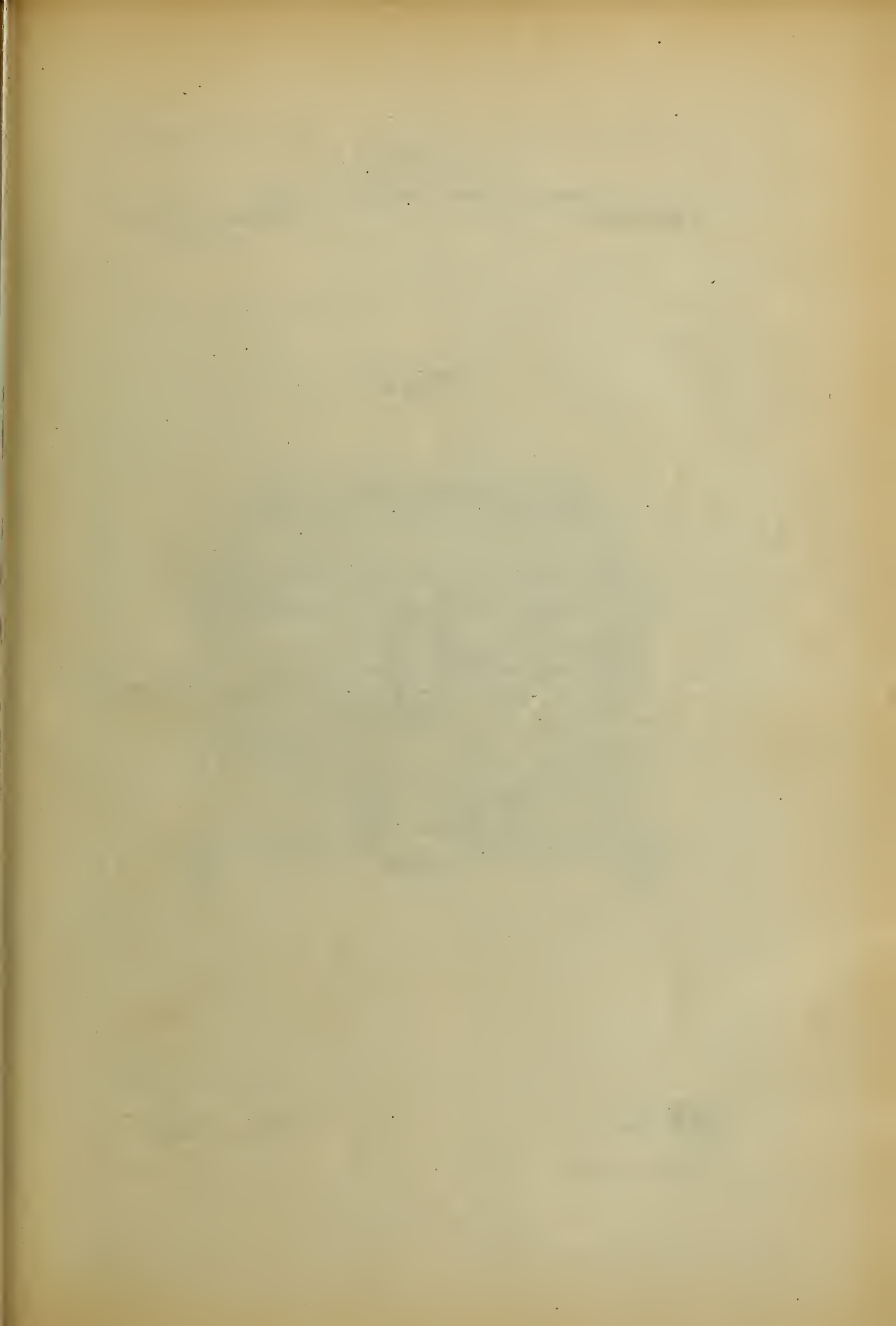
W. J. Hartman.

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BY

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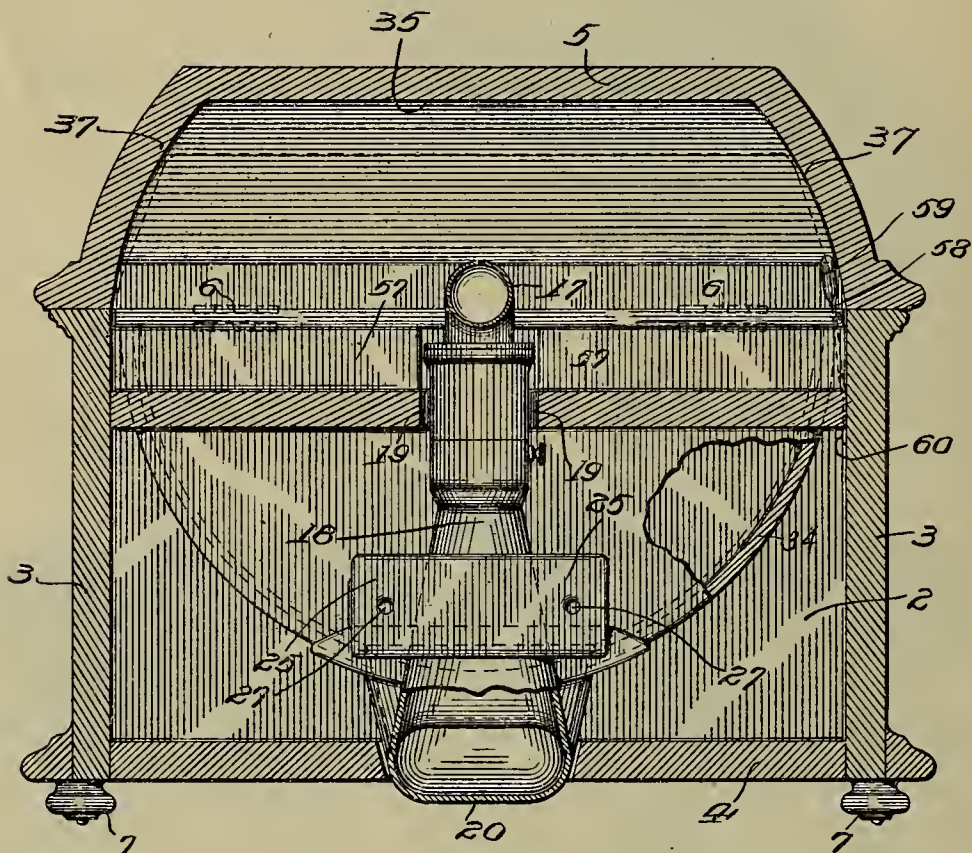
ATTORNEY



1,188,374.

Patented June 20, 1916.
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

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SOUND-REPRODUCING MACHINE.

1,188,374.

Specification of Letters Patent.

Patented June 20, 1916.

Application filed August 14, 1909, Serial No. 512,844. Renewed May 7, 1915. Serial No 26,659.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

The main objects of this invention are, to provide a compact talking machine having actuating mechanism, and sound reproducing and sound amplifying mechanism inclosed within a casing; to provide a talking machine having sound reproducing mechanism and a sound amplifier inclosed in a casing having an improved adjustable cover arranged to receive the sound waves delivered from the sound amplifier and to deflect the same in any desired direction; to provide a talking machine having an amplifier provided with an upwardly opening delivery end and inclosed in a casing having an adjustable cover arranged to deflect the sound waves delivered by the amplifier and to throw the same forwardly in any desired direction; to provide a talking machine having an amplifier with a delivery end inclosed in a casing provided with an adjustable cover arranged to deflect the sound waves delivered by the amplifier, and having an adjustable damper or closure arranged adjacent the delivery end of the amplifier to vary the quantity of sound waves directed against the deflecting surface of the cover of the casing, and thus modify the intensity of the sound waves delivered by the talking machine; to provide a talking machine inclosed in a casing having a movable cover and improved means for holding the cover in position of adjustment; to provide an improved sound amplifier; to provide sound modifying means for a sound amplifier; and to provide other improvements as will appear hereinafter.

In the drawings, Figure 1 is a fragmentary side elevation, partly in vertical section, of a talking machine constructed in accordance with this invention; and Fig. 2 is a fragmentary transverse vertical section partly in elevation on line 2—2 of Fig. 1 looking in the direction of the arrows.

Referring to the drawings, one embodi-

ment of this invention comprises a casing or cabinet consisting of a rectangular body portion 1 having front and rear walls 2, side walls 3, and a bottom 4, and an adjustable cover 5 which is pivoted to the upper edge of the rear wall 2 of the body of the casing upon hinges 6. The casing is preferably provided upon its under side with suitable supports 7. Within the body portion 1 of the casing and near the top thereof, is an upwardly removable horizontal partition 8, above and supported by which is a turntable 9, which is adapted to carry the usual disk sound record 10. Secured to and depending from the horizontal partition 8 is the usual actuating mechanism for rotating the turntable. Although in the present instance a turntable carrying a disk record is shown it is obvious that any other form of record support carrying a suitable record might be used in applying this invention.

A transverse vertical partition 11 extends between the bottom of the casing and the horizontal partition 8, and between the side walls 3, forming within the casing two compartments or chambers one of which is a closed compartment 12 within which is inclosed the actuating mechanism for rotating the turntable, and which also might be arranged as a storage compartment for records or talking machine accessories and the other of which is a compartment open at the top of the casing adapted to contain sound conveying and amplifying means described more particularly below. This partition 11 may be in the form of a rectangular resonant sounding board as shown, supported at its edges only, for a purpose to be explained hereinafter.

A sound box 15 or sound reproducing device of any well known construction is mounted upon and communicates with a tube 16, pivoted upon a horizontal axis to and communicating with the free end of a tapering tubular sound box arm 17, which extends rearwardly in a substantially horizontal direction, and the rear end of which is turned downwardly within the casing and is mounted in any well known manner to swing upon a fixed vertical axis upon the upper or inner end of a downwardly extending rigid tubular bracket 18 with which it communicates.

The tubular bracket 18 forms an intermediate section of a tapering sound amplifier,

the inner section or inlet end of which is formed by the tapering sound box arm 17. The horizontal partition 8 of the casing extends rearwardly beyond the vertical partition 11 and its rear edge is spaced forwardly from the inner surface of the rear wall 2 of the casing, and is provided centrally with a suitable recess 19 through which the upper or inner portion of the tubular bracket 18 extends, the bracket being preferably out of contact with the partition.

The lower portion of the hollow bracket 18 is curved rearwardly and then upwardly, forming a return bend or elbow 20 and terminates within the casing in an upwardly extending flaring socket 21, adapted to receive the body portion 22 of the amplifier. The hollow bracket 18 may be substantially uniform in diameter, measured in a direction parallel to the sides of the casing, flaring slightly toward the socket 21, but measured in a direction parallel to the rear of the casing, the bracket preferably flares or increases in diameter from its inner or upper end outwardly, as shown in Fig. 2. The hollow bracket is preferably substantially cylindrical at its inner end but it changes gradually to an oblong shape in cross section as it approaches the socket 21, which is preferably rectangular and oblong in cross section, having its long diameter substantially parallel to the rear wall of the casing.

For securing the hollow bracket 18 rigidly in position, the bracket is provided upon its front side intermediate of its ends with oppositely extending flattened projections 25 forming a base plate, having a flat front side which rests against the rear side of the vertical partition 11, and is held in position by bolts 26 which pass through holes 27, provided therefor in the base and in the partition, and are secured in position by nuts 28. Any other suitable means, however, obviously may be used, instead of or in addition to the means described for rigidly securing the bracket 18 to the vertical partition 11.

To economize space, the bottom 5 of the case is provided with an aperture 30 bounded by an inwardly flaring wall, and the elbow 20 of the hollow bracket 18 projects within this aperture, but preferably is out of contact with the flaring wall bounding the aperture, although very close thereto to prevent the escape of sound waves between the elbow and the wall of the aperture.

The body 22 of the amplifier is entirely supported by the socket 21 of the lower end of the bracket 18, extending upwardly from the socket and between the rear edge of the horizontal partition 8 and the rear wall of the casing, and is out of contact with the partition or any part of the casing. The

body of the amplifier comprises a series of upwardly extending flat sounding boards 31 substantially semi-circular in shape and having their curved edges inserted within the socket 21. The outer sounding boards bear against circular shoulders 32 formed between the inner surfaces of the transverse sides of the socket and the inner surfaces of the hollow bracket adjacent the socket, and the inner surfaces of the outer sounding boards are flush with the adjacent inner surface of the bracket, and the intermediate boards are sharpened at their lower edges as at 33, to avoid obstructing the passage of sound waves from the bracket into the body of the amplifier.

The curved edges of the sounding boards are connected together by means of oppositely extending curved side pieces 34, each of which extends from within one side of the socket 21 to the upper straight edges of the sounding boards and forms a deflector for the sound waves. The body of the amplifier is preferably constructed so that the sounding boards diverge slightly upwardly, although good results may be obtained when the sounding boards are substantially parallel.

The upper edges of the sounding boards and the curved side pieces are preferably arranged in a plane parallel to but slightly below the plane of the upper edges of the body of the casing. The long diameter of the upper or delivery end of the body of the amplifier is, in this construction substantially parallel with the back of the casing, and the delivery end extends substantially the full width of the interior of the casing and in proximity to the rear wall of the casing.

By this construction the hollow bracket 18 and the body 22 of the amplifier supported thereby are disposed and contained in one of the compartments in the casing formed by the partition or sounding board 11, in such a manner that the discharge end of the amplifier is disposed at or near the open side of said compartment and when the cover 5 of the casing is partly open, the sound waves issuing from the outlet of the amplifier strike against the inner surface of the cover and are deflected forwardly. The inner surface 35 of the top portion of the cover 5 is preferably concave substantially from its rear edge, a greater portion of the distance toward its front edge, the concave curved surface being formed preferably by a straight line traveling in a curved path and maintained always in a horizontal position parallel to the front wall of the casing. The remaining front portion 36 of the inner surface of the cover of the casing is flat, and is preferably arranged at an angle of about 45 degrees with the plane of the bottom edges of the cover, so that this flat surface

is substantially horizontal when the cover is open at an angle of about 45 degrees, as shown in Fig. 1. The sides 37 of the cover may be slightly concave upon their inner surfaces and may diverge slightly downwardly as shown, and serve to confine the sound waves and prevent them from passing off laterally from the casing. It is obvious that the shape of the inner surface of the cover might be modified to suit various purposes and might be formed to throw the sound waves from the machine either in parallel lines or in diverging or converging lines as preferred.

For holding the cover 5 in any desired position of adjustment, a downwardly extending link 38 is pivoted at its upper end 39 to the inner surface of one side of the cover 5, and the lower end of the link extends slidably through a slot 40 provided therefor in the horizontal partition 8 of the casing. Secured to the upper side of the horizontal partition 8, and surrounding the slot 40 is a slotted plate 41 provided with an upwardly projecting lug 42 adjacent to one side of the slot therein. Above the slot 40, and projecting inwardly from the adjacent side of the body of the casing is fixed a stud 43 upon which is pivoted a cam lever 44, to which is pivoted one end of a substantially horizontal actuating rod 45, which is slidably arranged above the horizontal partition 8 in a support 46 secured to the partition. The outer end of this rod 45 projects through an aperture 47 provided therefor in the front wall of the casing and the end of the rod is provided outside of the casing with a push button 48 whereby the rod may be operated. The rod is normally pressed outwardly by means of a spiral spring 49 surrounding the rod between the fixed support 46 and a collar 50 surrounding the rod and longitudinally adjustable thereon by means of a set screw 51. The cam lever 44 normally binds the link 38 against the lug 42, and prevents the link from moving downwardly, but does not offer any resistance to the upward movement of the link. When the actuating rod is pressed inwardly the cam lever is moved away from the link to release it. With this construction in mind, it is obvious that to open the casing it is simply necessary to raise the cover 5 and the same will be held automatically in any position to which it is moved, and that to close the casing it is simply necessary to push the button 48, whereupon the rod 45 will move the cam lever 44 out of engagement with the link 38, and the cover will then drop into a closed position. The position assumed by the cam lever 44 is shown in dotted lines, and the position of the cover 5 when closed and the link 38 is also shown in dotted lines in Fig. 1.

For the purpose of modifying the inten-

sity of the sound waves issuing from the machine, a damper or muffler 55 is provided, comprising a flat imperforate board or plate 56 adapted to cover the delivery end of the amplifier. This plate 56 is hinged to the upper edges of two vertical plates 57, which are secured upon the upper side of the rear end of the horizontal partition 8 flush with the rear edge thereof, and upon opposite sides of the hollow bracket 18 of the amplifier. To hold the damper 56 in any desired position, a base plate 58 having a thumb piece 59 projecting upwardly therefrom, and a spring arm 60 projecting downwardly therefrom, is secured by means of screws 61 to one end of the damper. The spring arm is arranged to bear against the inner surface of the adjacent side wall of the body of the casing with sufficient force to hold the damper in any desired position, and the upwardly extending thumb piece forms a convenient means of moving the damper.

In the construction above described, the shape and arrangement of the amplifying means together with the unique construction of the casing makes it possible to provide a talking machine having an amplifier of relatively large proportions, inclosed in a relatively shallow and compact casing, and moreover the improved form of the amplifier, particularly the form of the return bend or elbow of the intermediate or fixed portion of the amplifier, imparts an improved quality to the reproduction. The amplifier being supported upon a resonant sounding board 11, forming one side of a closed compartment or air chamber 12, also adds to the effect of the reproduction.

Although in the construction illustrated a tapering swinging sound box arm is shown, it is obvious that a cylindrical sound box arm might be used instead of the tapering arm and in this case, the sound box arm might not be considered as a portion of the amplifier, and the amplifier would then consist of the tapering bracket 18 and the resonant body portion 22 carried thereby. It is also obvious that various other changes might be made in the construction illustrated, and that the improvements described herein might be used in various relations other than those shown, without departing from the spirit of this invention or the scope of the appended claims.

Having thus described this invention, what I claim and desire to protect by Letters Patent of the United States: is:—

1. In a talking machine, the combination with a casing, of an amplifier having a delivery end within said casing, a damper adjustably mounted adjacent said delivery end, and resilient means between said damper and said casing to hold said damper in different adjusted positions.

2. In a talking machine, the combination with a casing, of an amplifier having a delivery end within said casing, a sound modifier mounted to swing on said casing
5 adjacent said delivery end, and resilient means between said modifier and said casing to hold said modifier in different adjusted positions.

3. In a talking machine, the combination
10 with a casing, of an amplifier having a hollow non-vibratory bracket extending downwardly within said casing and then upwardly and terminating in an upwardly opening socket, and upwardly extending
15 sounding boards secured in said socket.

4. In a talking machine, the combination with a casing, of an amplifier having a hollow non-vibratory bracket extending downwardly within said casing and then upwardly and terminating in an upwardly
20 opening socket, and upwardly extending sounding boards secured in said socket, the upper edges of said boards extending transversely of said casing substantially the full
25 width of the interior of said casing.

5. In a talking machine, the combination with a casing, sound reproducing mechanism, a reproducer arm, a tubular support for said arm, communicating with said arm
30 and extending downwardly in said casing and then being provided with a return bend, and a sound amplifying member communicating therewith and extending upwardly and discharging upwardly near one side of
35 said casing, said parts above mentioned being all carried by and mounted within said casing, of a cover, hinged to that edge of said casing adjacent the discharge end of said member, and cooperating therewith to
40 modify and amplify the sound emitted therefrom.

6. In a talking machine, the combination with a casing having a vertical transverse partition therein, of actuating mechanism
45 located in front of said partition, and sound amplifying means having an upwardly opening delivery end located in the rear of said partition, said sound amplifying means being entirely supported by said partition.

7. In a talking machine, the combination
50 with a casing, sound reproducing mechanism, a reproducer arm, a non-vibratory tubular support for said arm, generally increasing in cross-sectional area, communicating with said reproducer arm and extending
55 downwardly in said casing, and then being provided with a return bend, and a vibratory sound amplifying member communicating therewith and extending upwardly and discharging upwardly near one
60 side of said casing, all of said parts above mentioned being carried by and mounted within said casing, of a cover, hinged to that edge of said casing adjacent the discharge end of said member, and cooperating
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therewith to modify the sound emitted therefrom.

8. In a talking machine, the combination with a casing, of a sounding-board secured therein, hollow sound conveying means
70 entirely supported by said sounding-board, and sound reproducing means communicating with said sound conveying means.

9. In a talking machine, the combination with a sounding-board, of hollow sound
75 conveying means secured thereto and entirely supported thereby, sound reproducing means communicating with said sound conveying means, and sound amplifying means entirely supported by and communicating
80 with said sound conveying means, said sound amplifying means including a sounding-board.

10. In a talking machine, the combination with a casing, sound reproducing mechanism, a reproducer arm, a tubular support
85 for said arm, communicating with said arm and extending downwardly in said casing and then being provided with a return bend, and a sound conveying member communicating with said support and extending upwardly and discharging upwardly near one
90 side of said casing, all of said parts above mentioned being carried by said casing, of a hollow cover, closed at its top, sides and ends and open at the bottom thereof, hinged to that edge of said casing adjacent the discharge end of said member, for deflecting
95 and amplifying the sound waves discharged against it from said member when said cover is lifted.
100

11. In a talking machine, the combination with a sounding board, of a sound amplifier rigidly secured thereto and entirely supported thereby, the major portion of said
105 amplifier being out of contact with said sounding board.

12. In a talking machine, the combination with a casing and a record support, of a non-vibratory tubular bracket extending into
110 said casing and being provided with a return bend, a hollow vibratory sound amplifying member carried by one end of said bracket and discharging sound upwardly, sound reproducing means carried by the other end of said bracket, said parts above
115 mentioned being substantially all mounted within said casing, and a hinged cover secured to the top of said casing, which cover when raised at an angle to said casing serves to deflect the sound, delivered by said amplifying member, outwardly from said casing.
120

13. In a talking machine, the combination of a casing provided with a compartment
125 having an outlet opening, sound reproducing means carried by the casing and outside of said compartment, a hollow cover movably connected to the casing and adapted in a closed position to inclose the reproducing
130

means and to close over said outlet opening and in open position to provide a continuation of sound amplifying means, and a tapering sound amplifier inclosed within said 5 compartment and communicating with said reproducing means and discharging sound toward said cover.

14. In a talking machine, the combination of a casing, sound reproducing means 10 mounted on the casing, a hollow cover movably connected to the casing and adapted in closed position to inclose said reproducing means and in open position to constitute a deflector for the sound, and a conduit having 15 a return bend, said conduit communicating with said reproducing means and conveying sound to said cover.

15. In a talking machine the combination with a cabinet having a body portion and a 20 cover, of talking machine mechanism contained within the said body portion of the cabinet and including a sound reproducing mechanism and a tapering amplifier opening upwardly within said body portion and 25 at one side thereof, the cover being hinged to the body portion at said side thereof and adapted to inclose said reproducing mechanism and being adjustable at different angles with respect thereto to deflect the sound 30 from the amplifier across the top of the body portion of the cabinet.

16. In a talking machine, the combination with a sounding board, of sound reproducing 35 means, a sound conduit communicating with said reproducing means and including a tapering amplifier, said conduit providing a continuous passage from said reproducing

means to the mouth of the amplifier and being secured at an intermediate point in its length to said sounding board and being 40 wholly supported thereby.

17. In a talking machine, the combination with a cabinet having a compartment, of a continuous hollow sound conducting and amplifying member comprising a swinging 45 arm outside of said compartment, a bracket secured to said cabinet within said compartment and upon which said arm is mounted and supported and a hollow, resonant, vibratory body supported on said bracket and 50 extending in said compartment, said sound conducting and amplifying member being attached to said cabinet at substantially a single point only and that point being within said compartment. 55

18. In a talking machine, the combination with a cabinet, of a continuous hollow sound conducting and amplifying member comprising a swinging arm, a bracket within said cabinet and upon which said arm is 60 mounted and supported and a hollow, resonant, vibratory body supported on said bracket and extending in said cabinet, said sound conducting and amplifying member being attached to said cabinet at a point 65 within said cabinet and substantially midway between its extreme ends.

In witness whereof I have hereunto set my hand this 12th day of August A. D., 1909.

JOHN C. ENGLISH.

Witnesses:

EDWARD K. MACEWAN,
FRANK B. MIDDLETON, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

The first of the year was a very dry one, and the crops were much injured. The weather was very hot, and the crops were much injured. The weather was very hot, and the crops were much injured.

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1,188,509

STYLUS LEVER FOR PHONOGRAPH, SOUND BOXES,
#1,188,509-----H. Teichlauf,
Patented-June 27th, 1916.
Filed-July 13th, 1915.

H. TEICHLAUF.
 STYLUS LEVER FOR PHONOGRAPH SOUND BOXES.
 APPLICATION FILED JULY 13, 1915.

1,188,509.

Patented June 27, 1916.

Fig. 1,

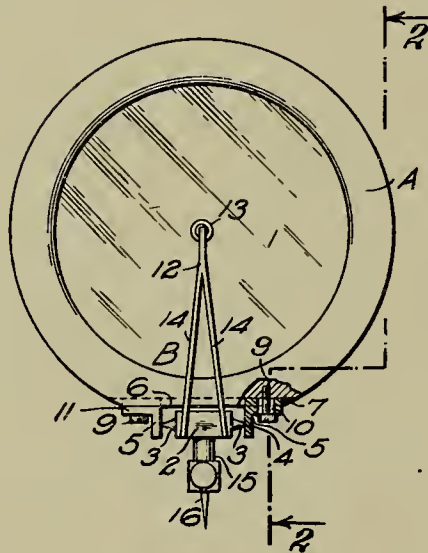


Fig. 2,

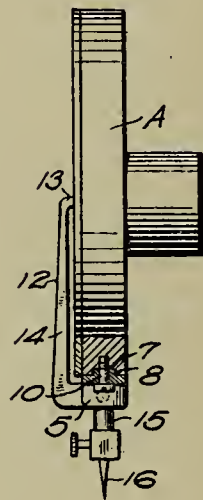


Fig. 3,

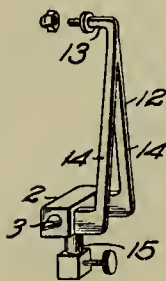
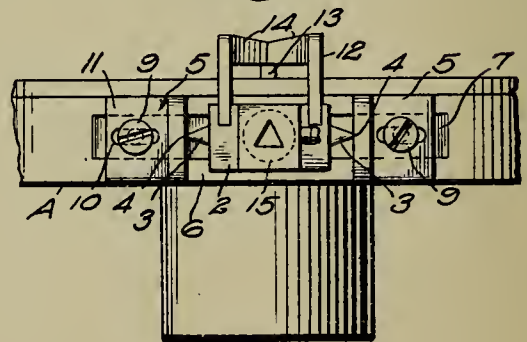


Fig. 4,



Fig. 5



WITNESSES
A. Hauerstein
C. Bradley

INVENTOR
Harry Teichlauf
 BY *M. M. Co.*
 ATTORNEYS

UNITED STATES PATENT OFFICE.

HARRY TEICHLAUF, OF NEW YORK, N. Y.

STYLUS-LEVER FOR PHONOGRAPH SOUND-BOXES.

1,188,509.

Specification of Letters Patent.

Patented June 27, 1916.

Application filed July 13, 1915. Serial No. 39,574.

To all whom it may concern:

Be it known that I, HARRY TEICHLAUF, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Stylus-Lever for Phonograph Sound-Boxes, of which the following is a full, clear, and exact description.

10 This invention relates to sound boxes for phonographs and has to deal more particularly with the stylus lever and mounting therefor.

15 The invention has for its general objects to improve the construction of devices of the character referred to so as to be reliable and efficient in use, comparatively inexpensive to manufacture, and so designed that the recording and reproduction of sounds is 20 materially improved.

25 A more specific object of the invention is the provision of a stylus lever which has a longitudinally divided or V-shaped arm between the pivot or fulcrum of the lever and the point of connection with the diaphragm, whereby louder and clearer sounds and better tones are obtained than with a lever having a solid arm.

30 Another object of the invention is to provide relatively adjustable bearings on the sound box body for the pivot points of the lever, whereby a fine adjustment can be obtained, so that the lever will not have detrimental vibrations due to unnecessary play.

35 With such objects in view, and others which will appear as the description proceeds, the invention comprises various novel features of construction and arrangement of parts which will be set forth with particularity in the following description and 40 claims appended hereto.

45 In the accompanying drawing, which illustrates one embodiment of the invention and wherein similar characters of reference indicate corresponding parts in all the views, Figure 1 is a front view of a sound box with the improvement applied thereto, a portion being shown in section to illustrate the details of construction; Fig. 2 is a sectional 50 view on the line 2—2, Fig. 1; Fig. 3 is a perspective view of the stylus lever; Fig. 4 is a perspective view of one of the bearings of the stylus lever; and Fig. 5 is an enlarged detail view of the mounting for the stylus 55 lever.

Referring to the drawing, A designates the body of the sound box in which is mounted in any suitable manner a diaphragm 1 to which the stylus lever B is connected. This lever has a central block-like 60 body 2 provided with pivot points or studs 3 projecting axially from opposite ends, and these points engage in shallow depressions 4 in adjustable bearings 5. These bearings are L-shaped members fastened to the periphery of the body A of the reproducer. 65 This body A has a flat surface 6 provided with a longitudinal central groove 7, and in this groove tongues 8 on the base members of the bearings 5 slidably engage. Clamping 70 screws 9 pass through slots 10 in the base members 11 of the bearings and screw into the body of the sound box, whereby the bearings can be clamped in any desired position of adjustment so that the lever can be 75 accurately mounted. The lever B has an arm 12 which extends radially of the sound box from the hub or body portion 2, and the inner end 13 of the lever is connected with the center of the diaphragm 1. From this 80 point the arm 12 is bifurcated, with the members 14 gradually diverging to the body or hub 2 of the lever, where the branches are rigidly connected. By actual test it has been found that this V-shaped arm conduces materially to improve the sound reproduction. 85 The other arm 15 of the lever has the usual socket for receiving the stylus or needle 16. It will be noted that the lever has considerable width at the hub or body 2 and the 90 bearing points are wide apart. This is advantageous, in that the lever can be stably supported on the sound box body, and by the proper adjustment of the bearings no rattling or extraneous sounds will be emitted, the lever vibrating in harmony with the 95 diaphragm.

100 From the foregoing description taken in connection with the accompanying drawing, the advantages of the construction and method of operation will be readily understood by those skilled in the art to which the invention appertains, and while I have described the principle of operation, together with the device which I now consider 105 to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made when desired as fall within the scope of the appended claims. 110

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A phonograph sound box comprising a
5 body, a diaphragm mounted therein, a stylus
lever radially disposed with respect to the
diaphragm, and means for fulcruming the
lever on the periphery of the body, said le-
10 ver having a needle-holding arm extending
outwardly from the fulcrum and an in-
wardly extending arm composed of two
members converging inwardly and inte-
15 grally connected together, the inner end of
the inner arm being rigidly connected to the
center of the diaphragm.

2. A phonograph sound box including a
body, a diaphragm, and a single lever ful-
crumed on the body and directly connected
20 with the diaphragm and forming a stylus
carrier, said lever including an arm extend-
ing inwardly from the periphery of the
body, said arm being composed of two mem-
bers converging inwardly toward the center
25 of the diaphragm and united rigidly to-
gether, and the said members being located
at opposite sides of a radial line passing
through the center of the diaphragm.

3. A phonograph sound box comprising a

body, a diaphragm mounted therein, and a
stylus lever consisting of a hub fulcrumed 30
on the body and having a needle-carrying
arm extending in one direction and an op-
positely extending arm composed of two
members rigidly connected with the hub and
converging therefrom toward the center of 35
the diaphragm in a plane substantially par-
allel therewith, and the outer ends of the
members uniting to form a laterally bent ex-
tremity rigidly connected with the center of
the diaphragm. 40

4. A stylus lever for a phonograph sound
box, comprising a hub, members rigidly
connected therewith and converging there-
from to form an arm that is provided with
a laterally bent extremity for connection 45
with a diaphragm, and a needle-carrying
arm connected with the hub and projecting
oppositely from the first-mentioned arm.

In testimony whereof I have signed my
name to this specification in the presence of 50
two subscribing witnesses.

HARRY TEICHLAUF.

Witnesses:

C. BRADWAY,
PHILIP D. ROLLHAUS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents
Washington, D. C."

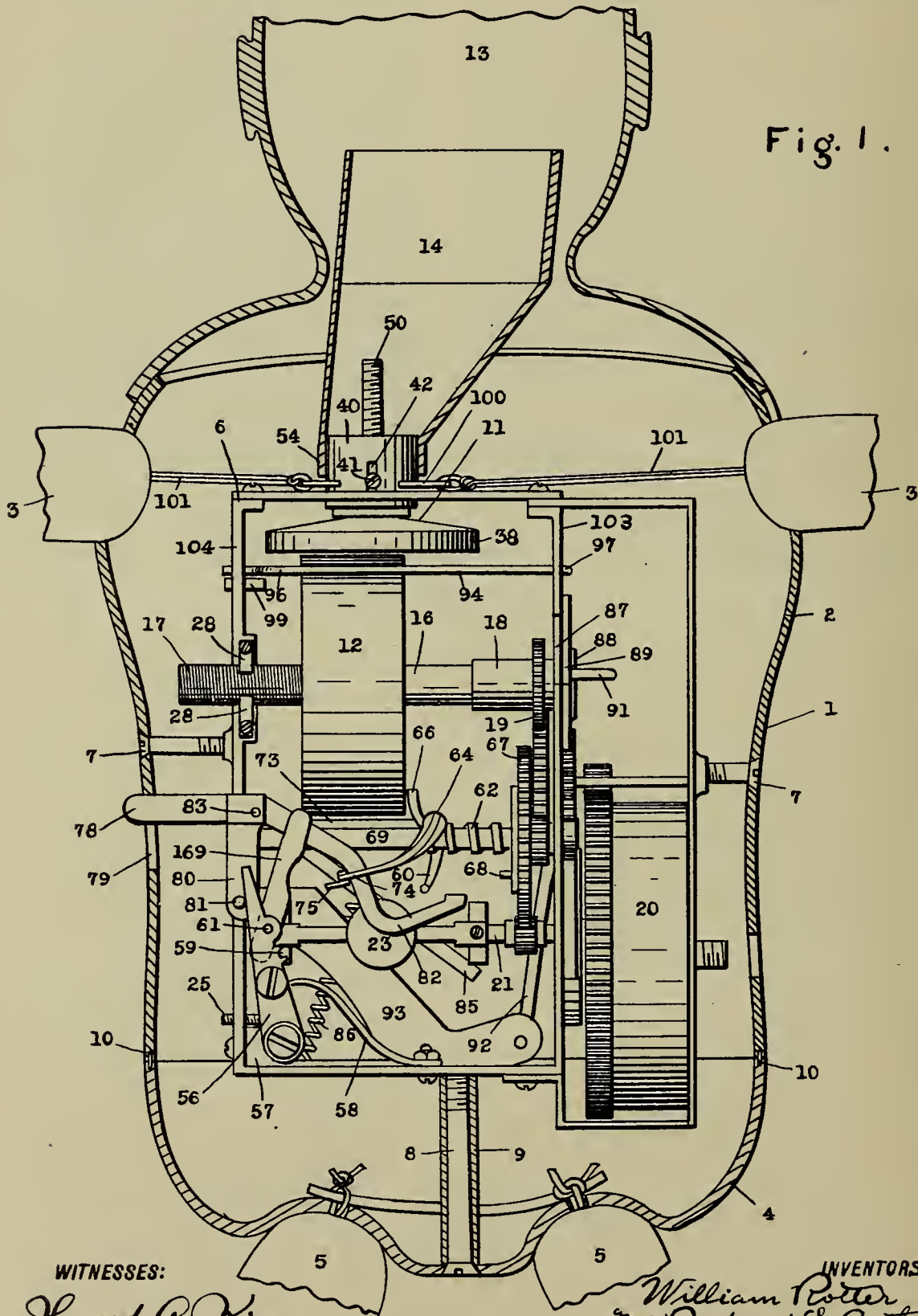
GRAPHOPHONE PATENT.

SOUND REPRODUCING MECHANISM,
#1,188,682-----W. Rotter & R. S. Arthur,
Patented-June 27th, 1916.
Filed-May 31st, 1913.

W. ROTTER & R. S. ARTHUR.
SOUND REPRODUCING MECHANISM.
APPLICATION FILED MAY 31, 1913.

1,188,682.

Patented June 27, 1916.
3 SHEETS—SHEET 1.

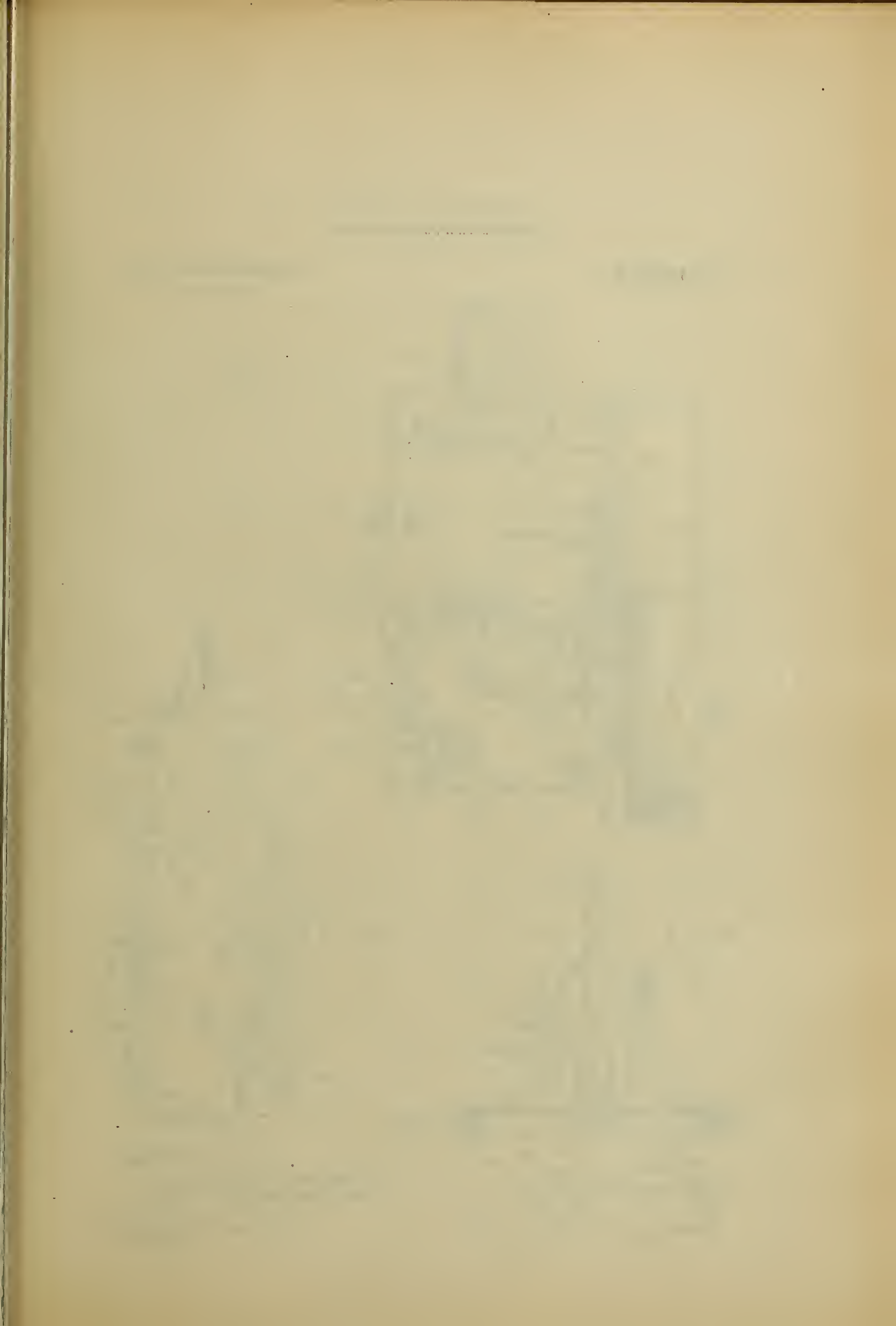


WITNESSES:

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Mildred E. Brooks

INVENTORS:

William Potter
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W. ROTTER & R. S. ARTHUR.
SOUND REPRODUCING MECHANISM.
APPLICATION FILED MAY 31, 1913.

1,188,682.

Patented June 27, 1916.

3 SHEETS—SHEET 2.

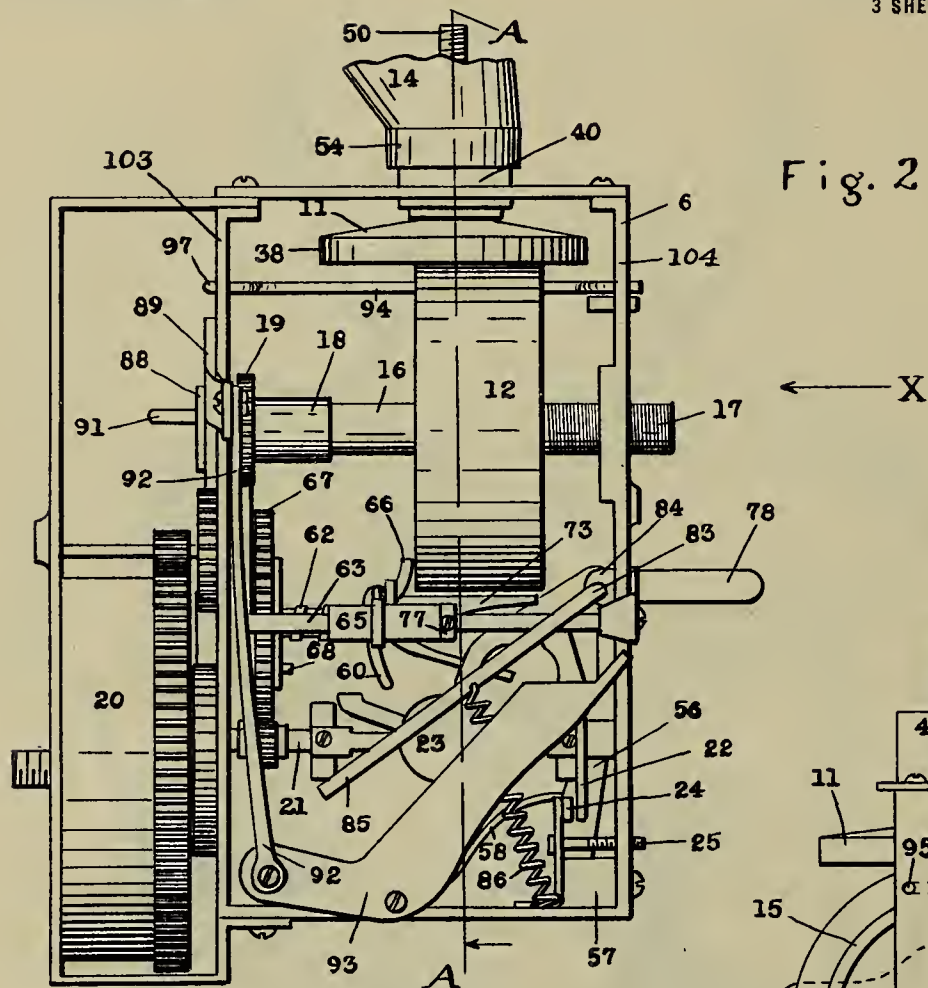


Fig. 2.

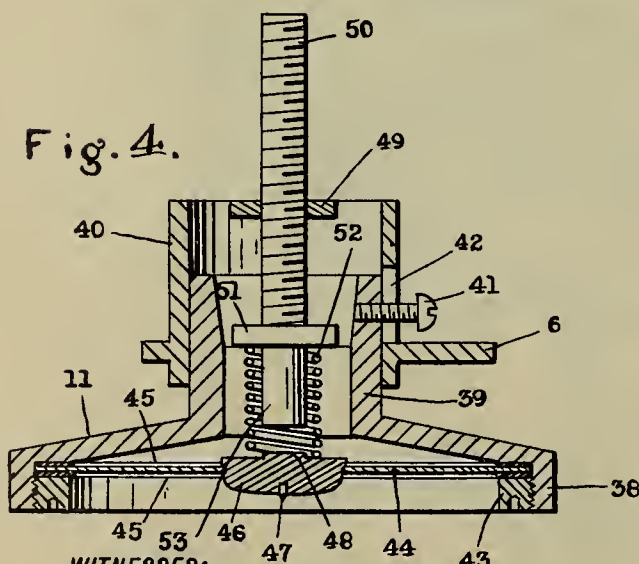
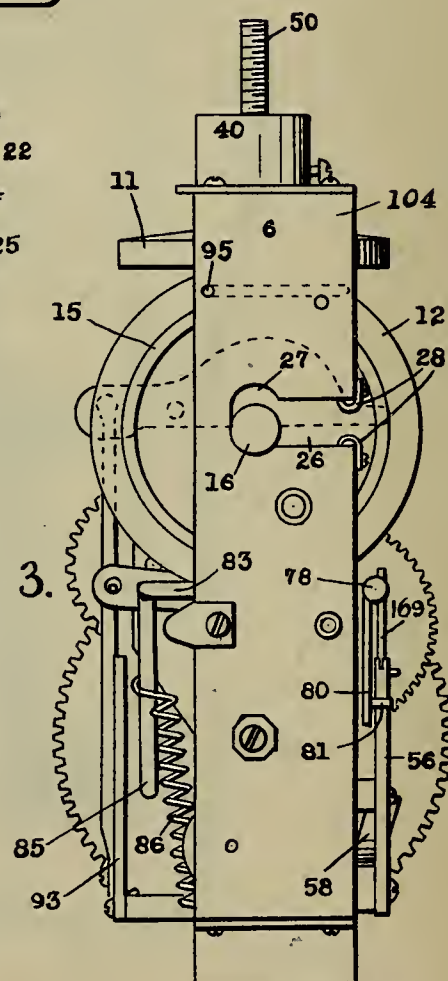


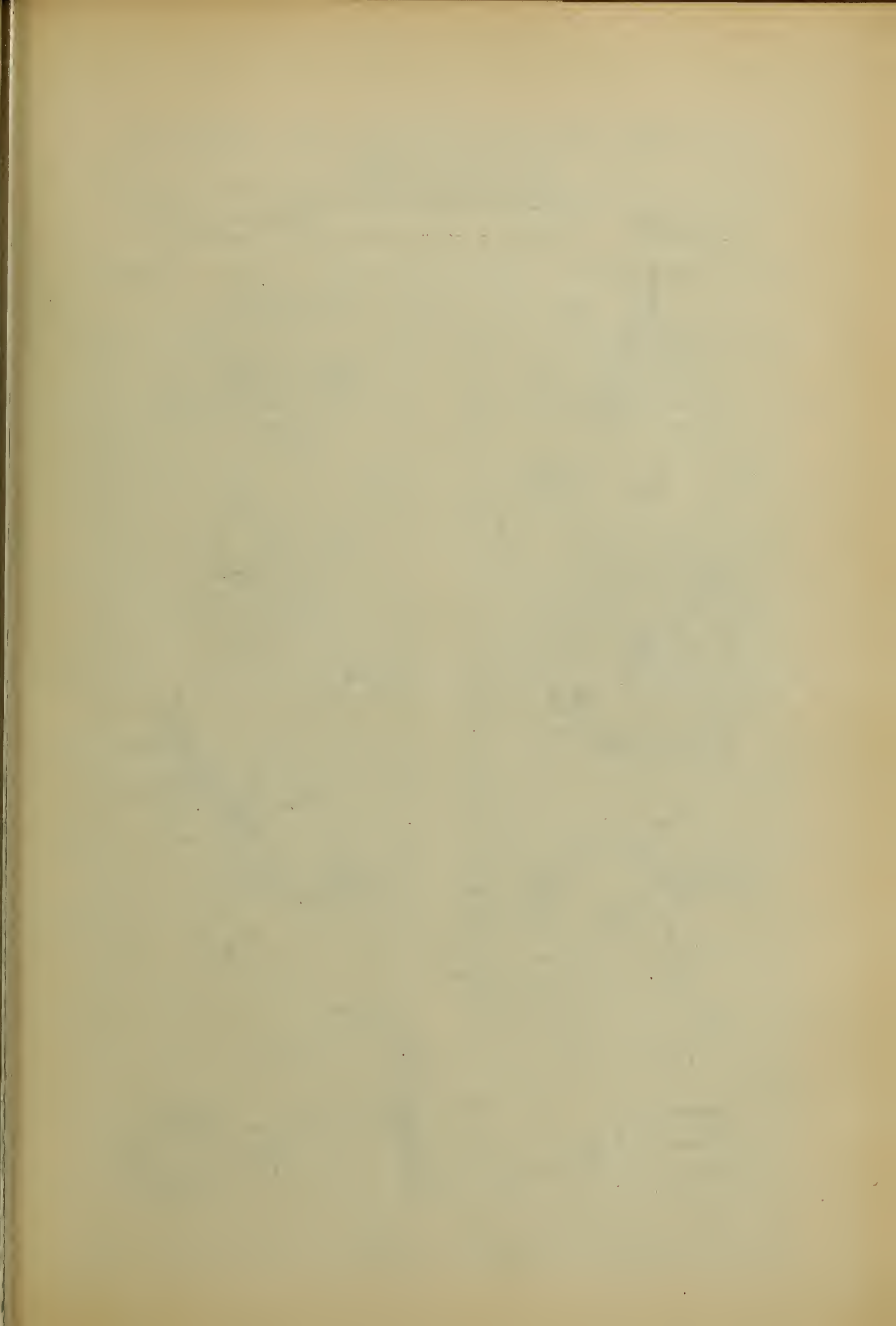
Fig. 4.

Fig. 3.



WITNESSES:
Howard P. King
Mildred E. Brooks

INVENTORS:
William Rotter
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BY
Russell M. Everett,
ATTORNEY.



W. ROTTER & R. S. ARTHUR.
SOUND REPRODUCING MECHANISM.
APPLICATION FILED MAY 31, 1913.

1,188,682.

Patented June 27, 1916.

3 SHEETS—SHEET 3.

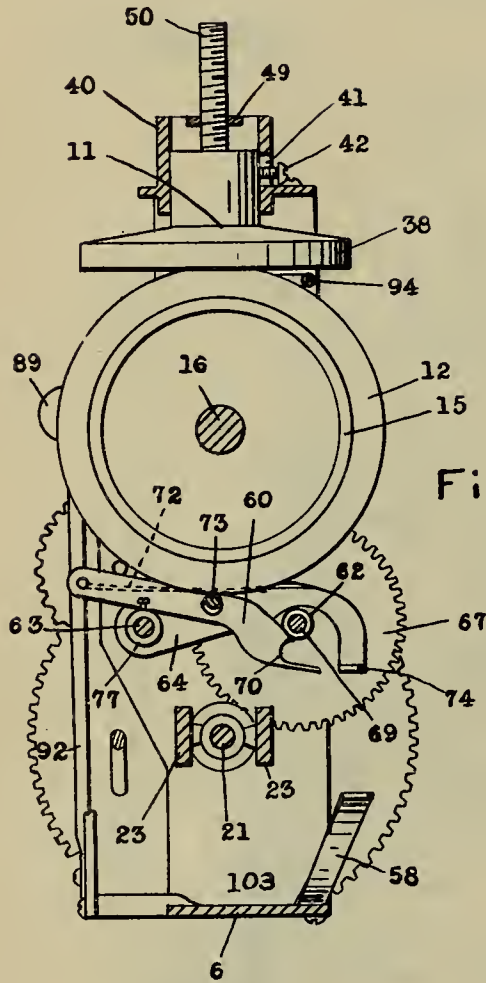


Fig. 5.

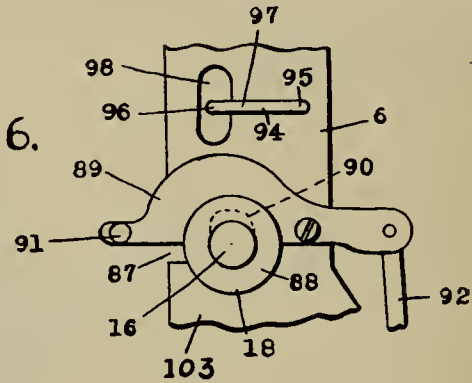


Fig. 6.

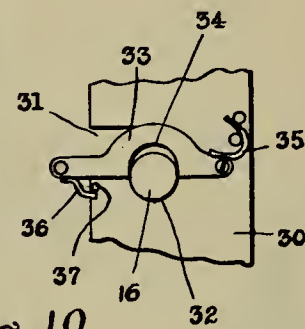


Fig. 10.

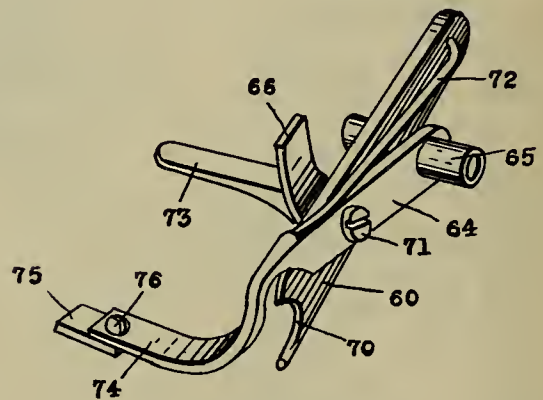


Fig. 8.

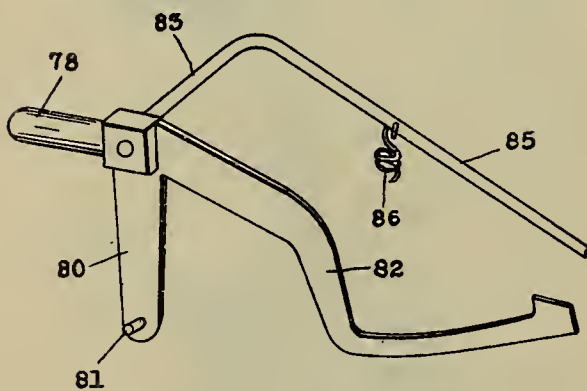


Fig. 7.

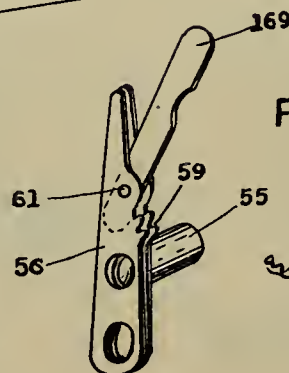


Fig. 9.

WITNESSES:

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Mildred A. Brooks

INVENTORS:

William Rotter
and Richard S. Arthur,
Russell M. Everett,
ATTORNEY.

UNITED STATES PATENT OFFICE.

WILLIAM ROTTER AND RICHARD S. ARTHUR, OF NEWARK, NEW JERSEY; SAID
ARTHUR ASSIGNOR TO SAID ROTTER.

SOUND-REPRODUCING MECHANISM.

1,188,682.

Specification of Letters Patent. Patented June 27, 1916.

Application filed May 31, 1913. Serial No. 770,827.

To all whom it may concern:

Be it known that we, WILLIAM ROTTER and RICHARD S. ARTHUR, citizens of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain Improvements in Sound-Reproducing Mechanisms, of which the following is a specification.

The objects of this invention are to provide an improved sound reproducing apparatus for use more particularly with dolls and other toys for making the doll appear to talk; to enable the sound reproducing apparatus to be conveniently operated and controlled, and records to be readily and easily changed; to provide means for positively moving the record-return mechanism out of the way of the record for removing and replacing the same; to provide means for positively releasing the record-return mechanism when starting the machine if it has already operated, and means for positively throwing in the record-return mechanism upon starting the machine, if it has not already operated; to provide improved means for releasing the brake spring from its detent relation to the brake arm to stop the machine; to provide a simple and convenient repeat attachment; to provide a reproducer in which the sapphire holder is attached directly to the diaphragm; to provide means arranged centrally of the diaphragm for regulating its tension; to locate the slot and pin connection between the diaphragm holder and its casing in the neck of the reproducer, and to obtain other advantages and results as may be brought out in the following description.

In the accompanying drawings, in which like numerals of reference indicate the same parts throughout the several views, Figure 1 is a vertical central section through the doll, looking from the back toward the front of the same, and showing the interior construction; Fig. 2 is a view of said interior construction from the front with the doll body removed; Fig. 3 is a side elevation looking toward the right-hand side of Fig. 4 as indicated by arrow X; Fig. 4 is a central vertical sectional view through the reproducer; Fig. 5 is a vertical section on line A—A of Fig. 4, looking in the direction indicated by the arrow; Fig. 6 is a side elevation of the arm for retaining the record spindle in position; Fig. 7 is a detail per-

spective view of the controlling handle and its attached parts; Fig. 8 is a detail perspective view of the device for raising and returning the record to its initial or starting position; Fig. 9 is a detail perspective view of the brake-carrying lever, and Fig. 10 is an elevation of a modified construction of feed-nut.

In the specific embodiment of the invention illustrated in said drawings, reference numeral 1 indicates the torso or body of a doll, made up of an upper section 2 carrying the arms 3, 3 and a lower section 4 carrying the legs 5, 5. Within the said torso or body 1 is a substantially rectangular strap metal frame 6 for carrying the various mechanisms hereinafter described. Said frame is supported in upright position within the upper section 2 of the doll body by screws 7, 7 in the opposite sides of the doll substantially midway between the top and bottom of said frame. A screw 8 in the bottom of the frame 6 introduced centrally upward from the bottom of the lower section 4 of the body or torso 1 holds said section to the frame and in proper joined relation to the upper section 2. This screw 8 is preferably provided with a sleeve 9 adapted to space the frame 6 away from the lower section 4 of the doll body so as to limit the screw 8 in drawing or clamping the parts together. The lower section 4 is therefore held through the agency of the frame 6 up against the upper body portion or section 2, and in order to prevent transverse slippage or twist, dowels 10, 10, are preferably arranged in the upper edge of the lower section to engage in suitable holes in the lower edge of the upper section.

The phonographic reproduction of sound is obtained by a reproducer 11 at the top of the frame 6 coacting with a cylindrical record 12 therebeneath, and it is a feature of the present invention to issue the sound from the head 13 of the doll, for which reason a horn 14 extends upward from the reproducer through the neck of the doll into the head. Said cylindrical record 12 is frictionally held upon a drum 15 fixed on a spindle 16 one end of which is screw-threaded, as at 17, so as to advance the record as it revolves, see Figs. 1 and 2. The other end of the spindle 16 is held in a driving collar 18 slidably splined thereto, allowing longitudinal movement of the spindle

within the collar. It is to be understood that the spindle 16 is mounted horizontally and extends across the frame 6 from side to side of the doll, and is rotated by a gear-wheel 19 on the driving collar 18 receiving its rotary movement through a suitable train of gearing from a spring within a casing 20 herein shown, as is usual and customary in the art. This train of gearing preferably includes a governor comprising a rotating governor shaft 21 carrying a friction disk 22 adapted to be slid by the centrifugal action of weights 23 as is usual in governors of the centrifugal expanding type. As the governor shaft 21 gains speed, the friction disk 22 is thus brought into contact with a brake 24 supported from the bottom of the frame 6 and which is held in adjustable relation to the normal position of the friction disk by means of a screw 25 from the side of the frame 6. An approximately constant speed of rotation of the record is therefore provided, the rate of which can be adjusted as desired.

The feed nut to coact with the threaded portion 17 of the record spindle 16 is preferably integral with the side of the frame 6, and comprises a T-slot the neck 26 of which is cut perpendicularly inward from the back edge of the side of the frame 6 to the vertical portion 27, so that when the spindle is slid transversely through the neck 26 it lodges in the bottom of said vertical portion 27. For preventing inadvertent dislodgment, the neck is provided with curved leaf springs 28 at its upper and lower walls, partly closing the opening provided by said neck. The spindle may be manually introduced or removed past these springs when so desired, but we do not wish to be understood as limiting ourselves to this particular means for retaining the spindle within the vertical slot, other means, such as shown in the modified construction of Fig. 10, being adapted to the purpose. In this modified arrangement the reference numeral 16 indicates the record spindle supported by a frame 30 in an appropriate slot similar to the one just described. This slot provides a horizontal neck 31 and a vertically disposed portion 32 at the inner end thereof into which the said spindle can seat. A latch 33 is pivoted adjacent this vertical portion 32 upon the opposite side thereof from the horizontal slot and provided with a notch 34 in its under edge adapted to take over the spindle when the latch is swung downward. A leaf spring 35 may be arranged at the pivoted end of the latch to hold the same normally depressed, and at the opposite end of said latch may be arranged a spring catch 36 to engage below a pin 37 projecting from the side of the frame to retain said latch in its depressed position. Obviously, for removing the spindle it is necessary to man-

ually raise the latch so that its notch disengages the spindle sufficiently that the same may be raised to the level of the horizontal neck 31 and slid out. In either of these constructions we thread the bottom of the vertical portion of the T-slot to coact with the threads on the spindle to advance the record.

As the record so rotates and advances, the reproducer 11 above referred to engages the same to produce the sound. This reproducer comprises a circular head 38 tapering upwardly inward from its peripheral edge to an upwardly projecting neck 39 integral therewith. Said neck 39 is slidably mounted in a collar 40 in the upper portion of the frame 6 and prevented from rotation therein by a transverse screw 41 projecting from the neck through a vertical slot 42 in the collar 40. Clamped by means of a clamping ring 43 screwed into the head 38 from its open bottom is the diaphragm 44 having washers 45, 45 about its peripheral margin, as is usual, and apertured centrally of itself to receive a stylus carrier 46 from the center of which depends the stylus 47 to engage the record. Said stylus carrier is preferably pressed into the aperture of the diaphragm and has at its upper side a central boss 48.

Extending diametrically across the upper end of the collar 40 slidably supporting the reproducer is a bridge or plate 49 having at its center a tension adjusting screw 50 depending axially coincident into the collar 40 and provided with an annular lateral flange or shoulder 51 adjacent its lower end. A helical spring 52 interposed between this flange or shoulder 51 and the stylus carrier 46, seats on the latter around its boss 48, the end 53 of the screw 50 depending below the flange 51 within the spring 52 maintaining said spring in approximate axial alignment and retaining it in position. By adjusting the screw 50 up or down, the tension of the spring 52 against the stylus carrier 46 may be varied for the reproduction of sound to the best advantage. As has been stated the sound is conveyed into the head 13 of the doll by the horn 14, the lower end of which is provided with a sleeve 54 adapted to fit about the upper end of the collar 40 for holding the reproducer in position, Figs. 1 and 2. As shown in Fig. 1, a yoke 100, to opposite ends of which are attached the bands 101, 101 for seating the arms 2, 2 of the doll, permits the unobstructed extension of the parts just described upward to the doll's head.

For starting and stopping the rotation of the record, we provide a brake 55 carried upon a brake lever 56, (see Figs. 1 and 9), and adapted to be swung thereby into or out of engagement with the friction disk 22. This brake lever is pivoted at its lower end in substantially upright position on a suitable bracket 57 in a lower corner of the

frame 6, to swing in the plane of said frame, and is held normally as shown in Fig. 1, with the brake on, by a leaf spring 58 bearing at its free end against said brake lever and attached at its other end to the lower portion of said frame. At a suitable point along the edge of the lever 56 against which the leaf spring 58 bears, is a notch 59 adapted to receive the said free end of the leaf spring when the lever is swung toward the same to release the brake and retain the lever in such position whereby the brake 55 thereon is held away or released from the friction disk 22 and allows the record to be rotated. In order to release the spring from the notch in stopping the mechanism, we provide a trip or trigger 169 pivoted to the brake lever 56, and as shown in the drawings said brake lever is preferably bifurcated longitudinally of itself with the trip 169 pivotally held between the two bifurcated portions thereof, as at 61, above the notch 59 in the brake lever. When the spring 58 seats in the said notch 59, it pushes the trip into the position shown in Figs. 1 and 9, and if subsequently the upper end of the trip is swung to bring the trip into alinement with the brake lever, its lower end will thrust the end of the leaf spring 58 out of the notch 59 and said spring will then operate to swing the brake lever 56 back into its normal position with the brake set.

In the reproduction of sound by our improved apparatus, the record 12 moves from left to right, as shown in Fig. 1 of the drawings, and between it and the gearing for moving it is a worm 62 parallel to and substantially midway between the record spindle 16 and the governor shaft 21, said worm being formed on a shaft 69 fast with respect to one of the gear wheels in the train of gearing. Parallel to this worm 62, in a substantially horizontal plane with the same, is a rod 63, see Fig. 5, upon which is slidably mounted the member for returning the record to initial position and stopping the entire mechanism or causing it to repeat, as desired. This member comprises an arm 64 having a sleeve 65 for its slidable support upon the rod 63, said arm projecting forwardly over the worm shaft 69 and adapted to slide idly over the worm 62 while the record is being actuated forwardly or during its sound producing period, said arm 64 being sufficiently broad where it rests upon the worm so as not to be interfered with by the rotation of the same but slide upon the outer edge of the thread thereof. An upwardly extending finger 66 carried by this arm 64, see Figs. 1 and 8, is engaged by the record holding drum 15 as the same is advanced during its rotation, said advancement of the drum thus sliding the entire member before it toward the gear 67 on the worm shaft 69. When the record has been

played, this arm 64 has been carried longitudinally of the worm over to said gear wheel 67 by which the worm is rotated, and from the inner face of this gear wheel projects a lateral pin or stud 68 eccentric to the axis of rotation and adapted to engage under the arm 64 and raise it when said arm has been pushed by the drum close up to said gear wheel. Pivoted to the arm 64, between the worm shaft 69 and rod 63, and preferably to the side of said arm next the record drum 16, is a dog 60 the rear end of which lies above said rod 63 and the forward end of which lies beneath the worm shaft 69 and is adapted to engage in the worm 62 when the stud or pin 68 raises the arm 64 as just described. Said forward end of the dog 60 has a hollowed head 70 adapted to fit against the worm 62, to mesh therewith, as clearly shown in Fig. 5 of the drawings, and by a careful inspection of said figure, it will be apparent that when the arm 64 is raised the forward end of the dog 60 will strike the worm 62 and swing said dog upon its pivot 71 so as to allow the hollow end 70 to seat itself against the worm 62. A spring 72 secured to the arm 64 and bearing against the rear end of the dog 60 normally holds said rear end of the dog against the sleeve 65 of the arm 64 to retain the dog in position to engage the worm. When the arm 64 is lifted as above mentioned and the dog 60 swings, as its forward end strikes the worm, it will be understood that the spring 72 yields and that when the upper horn of the seat 70 has passed the worm said spring immediately forces the rear end of the dog downward and seats its forward end against the worm. The worm then carries the entire member to the end of itself away from the gear wheel 67, thus returning the record to initial position by its finger 66, and furthermore a bracket 73 preferably at the point of pivoting of the dog 60, (although it might be otherwise suitably supported upon the arm 64), holds the record 12, its drum 16 and spindle 15 therefor, which is carried at its ends in slots more fully described hereinafter, elevated while the said arm 64 is in raised position, so as to disengage both the gear 19 for rotating said spindle and its thread 17 for moving it longitudinally.

It is preferable to provide the arm 64 at its forward end with an extension 74 projecting toward the brake lever 56, so that as the entire member is slid by the worm 62 toward said brake lever, such extension will strike the trigger 169 at the moment when the drum 15 has arrived at its initial or starting position. It will be understood that this engagement of the extension 74 with the trigger 169 swings it to release the brake lever 56 from its disengaged position, as already described, so as to stop

the entire mechanism. Furthermore, the extremity 75 of this extension 74 may be adapted to swing to one side, as by being pivoted to the body portion of the extension by a clamping bolt 76, see Fig. 8, especially, so that by turning this extremity to project idly toward one side of the extension 74 said extension will not engage the brake lever trigger 169 and the machine will repeat its reproduction of sound.

For greater positiveness, we have shown a collar 77 fixed on the rod 63 to limit sliding of the record return member in returning the record to initial position, but it will be understood that this collar can be omitted under some conditions.

In order to swing the brake lever 55 into the released position where it is detained by the leaf spring 58, as described, from the exterior of the doll, we provide a controlling lever having a finger piece 78 projecting through a suitable hole 79 in the side of the doll and pivoted to the side of the frame 6 at a suitable point, which is above the brake lever and worm shaft and rod 63, so as to swing in a plane parallel to the said frame at the front side thereof. Said controlling lever has a depending arm 80 with a laterally projecting pin 81 adjacent its lower end, which is adapted to engage the brake arm 56 and swing the same into released position when the finger piece of the controlling lever is depressed, see Fig. 1.

In case the engagement of the record return member with the pin 68 of the gear 19 should stop the motor by any failure to operate properly, so that the record would not be returned to its initial position and therefore not started when the finger piece of the controlling lever is depressed, a front arm 82 is provided on the controlling lever, see Figs. 1 and 7, adapted to engage under the arm 64 if stuck as above stated and raise the same when the finger piece is depressed, said arm 82 being bent in any suitable manner to avoid interference with the travel of the record return member and its parts.

The pivotal support of the controlling lever 78 is preferably by a transverse pivot rod 83 fixed with respect to the finger piece and rotatably supported in a bracket 84 secured to the frame 6. Said pivot rod projects across the side piece of the frame beyond the same and has at its opposite end a rear arm 85, see Fig. 2, adapted to swing upward when the finger piece 78 is depressed and strike the rear end of the dog 60 to release the same from the worm 62 and cause it to drop into normal disengaged position, as already described. A helical spring 86 attached at one end to any convenient point of this rear arm 85 and at its other end to the frame 6, or other-

wise suitably arranged, tends to normally hold the controlling lever in idle position.

For changing the record, it is necessary to remove the shaft 16 carrying the record drum 15 from the frame 6, and in order to do this the drive collar 18 of the said spindle must be removably mounted in its end piece of the frame similarly to the removable mounting of the threaded end of the spindle which has already been described in the early part of this specification. This is done by forming in the end piece 103 a T-slot 87 having a horizontal portion extending from the front edge of the end piece inward and a transverse portion extending longitudinally of said end piece, the collar adapted to be inserted through said horizontal portion into the bottom of the longitudinal portion of the slot and the end piece 103 received between the gear 19 and a flange 88 on the end of the collar, both overlapping the end piece beyond the edges of the slot so as to prevent longitudinal movement of the collar. For releasably holding said collar 18 seated, we provide a retaining latch 89 pivoted to the end piece 103 having on its under side a recess 90 adapted to take over the collar when the lever is normally swung downwardly thereupon about its pivotal support. A handle 91 is provided at the outer end of this retaining latch 89 and the other end projects beyond the pivotal support on the frame to the rear of the frame and has a downwardly extending link or connecting rod 92 pivotally attached at its lower end to one arm of a bell crank 93 fulcrumed on the frame 6 to swing in a plane parallel thereto. The other arm of this bell crank 93 is upwardly inclined and adapted to swing across the back of the machine when the retaining latch 89 is raised to release the shaft, and laterally engage the protruding end of the dog 60 to shift the record return member bodily from whatever position it may be in over adjacent to the driving gear-wheel 19, whereby said return member will not obstruct the path or be in the way of removing the record spindle from its bearings. Furthermore, when the said collar retaining latch 89 is raised, by its handle 91, it operates means for lifting the reproducer 11 and supporting the same until the record spindle and drum are returned and said retaining lever lowered. These means are shown as comprising a bail 94 pivoted as at 95, 95 in the end pieces 103, 104 of the frame 6, near their rear edges and preferably right over the axial line of pivoting of the retaining latch 89, the main bowed portion 96 of said bail lying between the reproducer and record in front of their point of engagement with each other. From the pivoted end of the bail

in the end piece 103 on which the retaining latch 89 is mounted, a radial arm 97, shown as an integral part of the bail, outside said end piece, extends forward over the retaining latch to be engaged thereby as the latch is lifted and swing the bail to raise the reproducer. Preferably, the end of said arm 97 is bent to extend through a slot 98 in the end piece 103 and underlie the body portion of the bail, for greater rigidity and positiveness. A stop 99 in the other end piece 104 is provided to limit dropping of the bail in idle position by engaging its body portion, also, or any other equivalent limiting means can be employed.

By the improved construction and arrangement of reproducer herein set forth, by which the stylus is held against the record by spring tension, our sound reproducing apparatus is independent of gravity and the doll may be held in any position and yet talk or sing equally well.

Various departures may be made from the exact detail construction herein shown and described for purposes of illustration, and we do not wish to be understood as limiting ourselves except as required by the following claims when construed in the light of the prior art.

Having thus described our invention, what we claim is—

1. In a sound reproducing mechanism, the combination with a frame providing a laterally open bearing, a collar rotatively mounted in said bearing, a latch for holding said collar in said bearing, a record spindle in said collar, a reproducer mounted above said record spindle to move up and down, and a bail pivoted in said frame beneath said reproducer and adapted to be engaged by the said latch when opened to swing said bail upward against the reproducer and raise the same.

2. In a sound reproducing mechanism, the combination with a frame providing a bearing which is laterally open at the front of the frame, a collar rotatively mounted in said bearing, a latch for said collar pivoted upon said frame at the rear of said bearing, a record spindle in said collar, a reproducer mounted above said record spindle to move up and down, and a bail extending beneath the front part of said reproducer and pivoted at its ends near the rear of the frame, said bail adapted to be swung upward by the latch when opened and lift the reproducer.

3. In a sound reproducing mechanism, the combination with a longitudinally moving record mandrel, of a slideway and a worm shaft both parallel to said mandrel, means for rotating said mandrel and worm shaft, a record return member mounted on said slideway and worm shaft and adapted to be slid idly thereof as the record mandrel

advances, and means for engaging said record return member with the worm at a predetermined point to carry the record mandrel backward.

4. In a sound reproducing mechanism, the combination with a record mandrel adapted to move longitudinally of its axis and means for advancing the same, of a slideway and a worm shaft both parallel to the axis of said mandrel, means for rotating said mandrel and worm shaft, a record return member mounted on said slideway and worm shaft having a finger adapted to engage the record mandrel, said member adapted to be slid idly forward as the record mandrel advances, and means for disengaging said mandrel from its advancing means and engaging said return member with the worm at the same time.

5. In a sound reproducing mechanism, the combination with a record spindle having a threaded portion engaging a threaded seat, a record mandrel on said spindle, and means for turning said spindle, of a slideway and a worm shaft both parallel to said record spindle, means for turning said worm shaft, a record return member mounted on said slideway and worm shaft having a finger adapted to engage the side of the mandrel and a bracket beneath said mandrel, said member adapted to slide idly forward with the mandrel, and means for raising said return member into engagement with the worm shaft and causing its said bracket to lift the record spindle out of engagement with its seat.

6. In a sound reproducing mechanism, the combination with a longitudinally movable record mandrel, of a slideway and a worm shaft both parallel to said mandrel, a record return member comprising an arm fulcrumed on said slideway and projecting above the worm shaft and a dog fulcrumed on said arm intermediate the slideway and worm shaft with one end over-lying said slideway and the other end under-lying the worm shaft and adapted to mesh with the thread thereof when the arm is lifted, means on said return member for engaging the mandrel, means for driving said mandrel and worm shaft, and means for lifting the said arm of the return member to engage the said dog with the worm.

7. In a sound reproducing mechanism, the combination with an axially movable record mandrel, of a slideway and a worm shaft both parallel to the axis of said mandrel, a record return member comprising an arm slidably fulcrumed on said slideway and projecting toward one side of the worm shaft, and a dog fulcrumed on said arm projecting toward the other side of the worm shaft and having an end adapted to mesh with the worm, said mandrel and return member each being adapted to engage and

slide the other in turn, means for driving said mandrel and worm shaft, and means for swinging the said arm of the return member to engage the said dog with the worm.

8. In a sound reproducing mechanism, the combination with a record and a motor and driving mechanism therefor, of a brake, a brake lever for operating said brake, a spring normally holding said brake lever in initial position and adapted to retain the brake lever at the other range of its movement, a trip on said brake lever adapted to release said spring when detaining the lever, means for returning the record to initial position, and means for operating said trip as the record is returned to initial position.

9. In a sound reproducing mechanism, the combination with a record of a brake, a brake lever, a spring normally forcing said brake lever toward one end of its range of movement and adapted to detain it at its other end of movement, a trip pivoted on said brake lever and adapted to release said spring as a detent, means for returning the record to initial position, and means operated by the return of the record to initial position for releasing said trip.

10. In a sound reproducing mechanism, the combination with a record carrier, a motor and driving mechanism, of a brake, a brake lever, a spring normally pressing said brake lever toward one end of its range of movement and adapted to detain it at the other end of its movement, a trip adapted to release said brake lever when detained by the spring, and means operated by the record carrier for actuating said trip.

11. In a sound reproducing mechanism, the combination with a record carrier, a record return member, and means for operating said parts, of a brake, a brake lever, a spring normally forcing said brake lever toward one end of its range of movement and adapted to detain it at the other end, a trip adapted to release said brake lever when detained by the spring, and means on said return member for engaging said trip.

12. In a sound reproducing mechanism, the combination of a brake, a brake lever, means normally tending to apply said brake and adapted to detain the same in released position, a trip for disengaging the brake when so detained, a record return member adapted to operate said trip, and driving means.

13. In a sound reproducing mechanism, the combination of a brake, a brake lever, a spring adapted to detain said brake lever in position to release the brake and to press against it at all other positions to apply the brake, a controlling lever adapted to swing said brake lever into position to release the brake, a trip for disengaging said brake lever from detained relation to the spring, a record adapted to be returned when played

to initial position, driving means and a member actuated by said driving means as the record is returned for operating said trip.

14. In a sound reproducing mechanism, the combination of a brake, a brake lever, a spring adapted to detain said brake lever in position to release the brake and to swing it from all other positions to apply the brake, a trip for disengaging said brake lever and spring from detaining relation, a record return member adapted to operate said trip, means for actuating said return member, and a controlling lever adapted to swing said brake lever into position to release the brake and to engage said record return member with its actuating means.

15. In a sound reproducing mechanism, the combination of a brake, a brake lever, a spring adapted to detain said brake lever in position to release the brake and to swing it from all other positions to apply the brake, a trip for disengaging said brake lever and spring from detaining relation, a record return member, a piece on said return member adjustable to either engage said trip or not engage it, and means for operating said return member.

16. In a sound reproducing mechanism, the combination with a slideway and a worm shaft, of a record return member comprising an arm slidably fulcrumed on said slideway and projecting toward one side of the worm shaft and a dog fulcrumed on said arm projecting toward the other side of the worm shaft and having an end adapted to mesh with the worm, means for driving said worm shaft, and a controlling lever having an arm adapted to engage said return member with the worm at one end thereof and a second arm to disengage the return member from the worm at the other end thereof.

17. In a sound reproducing mechanism, the combination with a record mandrel, a return member, and means for advancing said record mandrel and operating said return member to carry the mandrel backward, of a controlling lever for starting and stopping the mechanism having one arm for engaging the return member with its said operating means at one end of its range of movement and another arm for disengaging said return member from said operating means at the other end of its range of movement.

18. In a sound reproducing mechanism, the combination with a record mandrel, a return member, means for advancing said record mandrel and operating said return member to carry the mandrel backward, of a controlling lever for starting and stopping the mechanism having an arm for engaging the return member with its said operating means at the forward end of its range of movement.

19. In a sound reproducing mechanism, the combination with a record mandrel, a return member, a worm for driving said return member backward, means for automatically engaging said return member with said worm and means for actuating said parts, of a hand lever having an arm for throwing said return member into engagement with its said worm.

20. In a sound reproducing mechanism, the combination with a record mandrel, a return member, a worm for driving said return member, and means for actuating said parts, of a hand lever having one arm for throwing said return member into engagement with the worm at one end thereof and a second arm to disengage the return member from the worm at the other end thereof.

21. In a sound reproducing mechanism, the combination with a record return member, a worm for actuating said return member, driving means, a brake, and a brake lever for releasing said brake, of a controlling lever having one arm for operating said brake lever another arm for engaging said return member with its worm at one end thereof and a third arm for disengaging said return member from its worm at the other end thereof, and means for holding said controlling lever normally in idle position.

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Witnesses:

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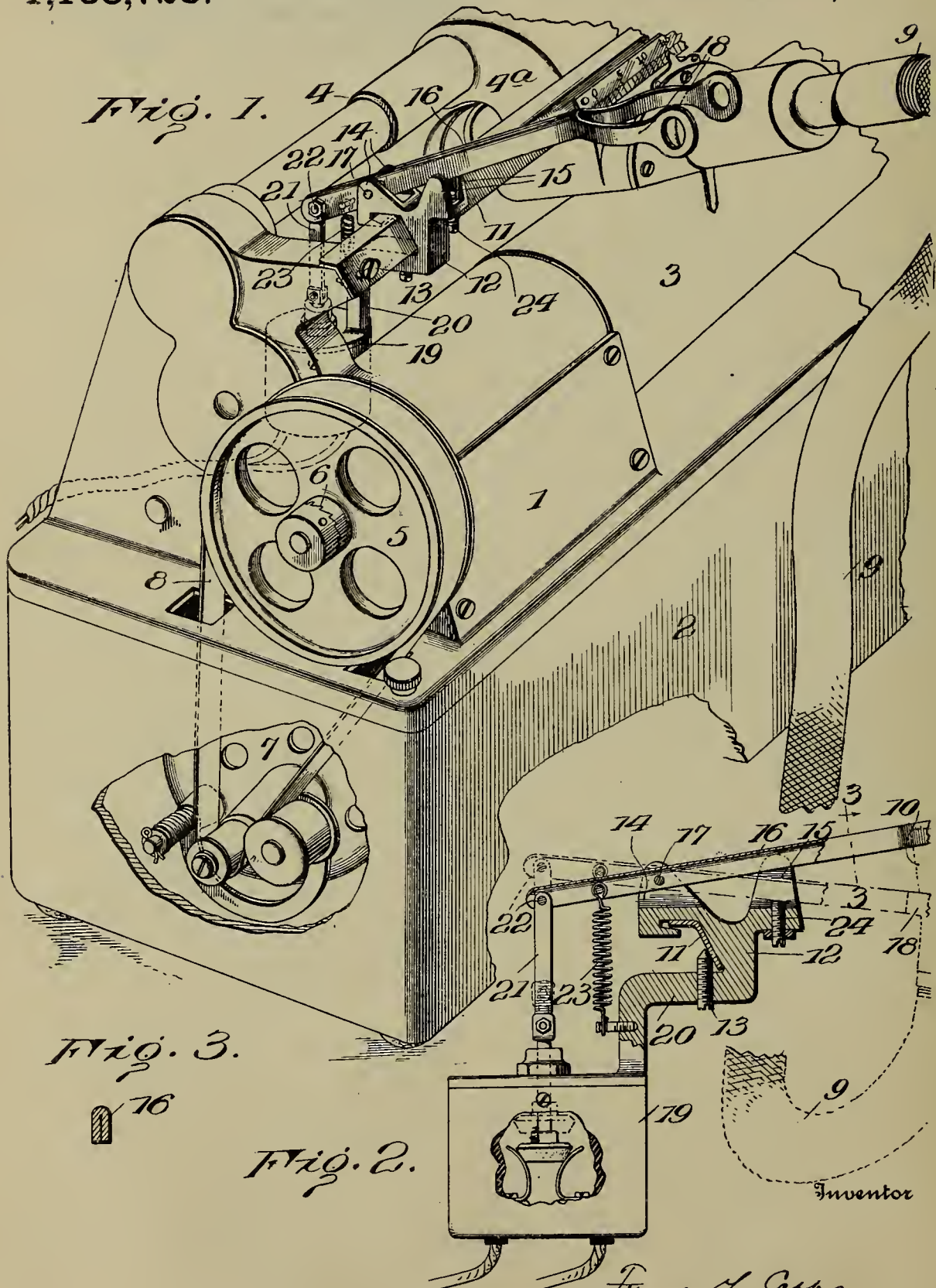
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE AND ATTACHMENT THEREFOR,
#1,188,728-----Frank L. Capps,
Patented-June 27th, 1916.
Filed-June 28th, 1915.

F. L. CAPPS.
TALKING MACHINE AND ATTACHMENT THEREFOR.
APPLICATION FILED JUNE 28, 1915.

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UNITED STATES PATENT OFFICE.

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TALKING-MACHINE AND ATTACHMENT THEREFOR.

1,188,728.

Specification of Letters Patent.

Patented June 27, 1916.

Application filed June 28, 1915. Serial No. 36,800.

To all whom it may concern:

Be it known that I, FRANK L. CAPPS, a citizen of the United States of America, and a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Talking-Machines and Attachments Therefor, which invention is fully set forth in the following specification.

The invention relates particularly to talking machines adapted for office use in the dictating of correspondence and the like.

The object of the invention is to provide, in a machine of this class or as an attachment for such a machine, an automatically acting mechanism for starting and stopping the motor as the mouth-piece of the speaking tube is moved into or out of operative position.

In the accompanying drawing I have shown the embodiment of the invention which I now deem preferable, but it will be understood that this particular embodiment is presented merely for purposes of illustration and that the invention can be embodied in numerous other ways, the scope of the invention being indicated by the claims appended to this specification.

Of the drawing, Figure 1 is a perspective view showing some of the principal parts of a talking machine embodying my invention; Fig. 2 is a fragmentary detail view partly in section and partly in elevation showing the parts to which my invention especially relates; Fig. 3 is a detail sectional view taken along the line 3—3 of Fig. 2.

In the drawing I have illustrated a talking machine of the well known "dictaphone" type, but it is to be distinctly understood that the invention is not limited to machines of this particular sort. In the construction illustrated, 1 represents the main frame, the lower part of which is in the form of a flat plate which serves as a cover for the casing 2. Rotatably mounted in a bracket of the frame is the mandrel or record support 3. Also mounted on the main frame with its axis parallel to the axis of the mandrel support is a guide 4 for the combined recorder and reproducer 4^a. Preferably this guide 4 is hollow and has contained therein the feed screw for the recorder-reproducer, mounted and driven in the way well known to those skilled in

this art. As the specific construction of the recorder-reproducer and of the feeding mechanism therefor constitutes no part of my present invention, the details are not illustrated.

In the construction shown the mandrel is driven by means of a wheel 5 which is loose on the mandrel shaft but which can be operatively connected therewith by means of a jaw clutch 6. This clutch can be thrown into and out of operation in any of the well known ways, it being preferably opened and closed manually. For rotating the wheel 5 a suitable motor is provided, this motor in the preferred construction being an electric motor as indicated at 7 in the drawings. This motor is connected with the wheel 5 by a suitable power transmitting device such as the leather belt 8.

The motor is provided with a suitable device for starting and stopping it, and in the case of an electric motor, such as here shown, the starting and stopping device is a suitable switch.

Connected with the recorder-reproducer preferably by means of a long flexible tube 9 is a mouth-piece 10 into which the dictator talks. This mouth-piece is movable vertically with respect to the recorder-reproducer and a suitable support for it is provided for holding it in a definite predetermined inoperative position. In accordance with my invention this support for the mouth-piece is mechanically connected with the start and stop mechanism for the motor, in this case the switch, so that the motor is started when the mouth-piece is removed from its support and stopped when the mouth-piece is returned to its support.

In the construction illustrated use is made of the horizontal bar 11 which is provided on "dictaphones" for carrying the scale which indicates the position of the recorder-reproducer. Secured to this bar is a bracket 12 having a recess with walls adapted to fit the top and side surfaces of the bar. Extending through the bottom of the bracket is a set screw 13 adapted to engage the inner side of the bar and lock the bracket in place.

The bracket 12 is provided with two pairs of ears 14—14 and 15—15 between which extends a hook lever 16. This hook lever is preferably formed of sheet metal doubled

upon itself throughout the major part of the lever, as indicated in Fig. 3. The lever 16 is pivoted at 17 to the two ears 14—14 and it extends between the ears 15—15 to be guided thereby. The lever 16 is provided at its front end with two forks 18—18 which are shaped to receive and hold the mouth-piece 10.

The start and stop device for the motor, which in the present construction is a switch, is indicated at 19. Preferably, for the sake of convenience and simplicity, this switch 19 is secured to an arm 20 formed integrally with the bracket 12. The switch can be of any suitable construction but I prefer a switch having a cylindrical casing and having a plunger working therein. Suitable contacts are carried by the casing and the plunger so that the circuit is completed when the plunger is in its lower position and broken when the plunger is in its upper position. Suitable electrical connections are provided between the switch 19 and the motor 7, these not being shown in detail as they will be obvious to those familiar with electrical constructions.

For operating the plunger of the switch 19, I provide a link 21 pivotally connected at its lower end to the plunger and pivotally connected at its upper end to the hook lever 16, as indicated at 22. Connected to the hook lever 16 is a spring 23 which tends to throw the rear end of the lever downward, thus throwing the switch into its circuit making position. Preferably this spring is a coil tension spring connected at its upper end to the rear part of the lever and at its lower end to the arm 20. The spring 23 is of such strength as to throw the switch into operative position when the weight of the mouthpiece and speaking tube is not carried by the forward end of the lever. But when the mouth-piece is carried by the forward hooked end of the lever, the tension of the spring 23 is overcome and the switch 19 is opened. Preferably there is provided a set screw which extends upward between the two ears 15—15 of the bracket and serves as a stop to limit the downward movement of the lever 16, thus preventing the transmission to the switch of the weight of the mouth-piece and speaking tube. This set screw is indicated in the drawing by 24 and it is preferably adjustable.

From the foregoing description, it will be understood that the user of the talking machine need give no attention to the motor. When he desires to dictate it is only necessary for him to pick up the speaking tube and start talking. When he has finished dictating, it is only necessary for him to hang up the mouth-piece and speaking tube and the motor automatically stops. It will of course be understood that the opera-

tor may, and preferably does, make use of the mechanical clutch 6 above referred to for stopping and starting the mandrel and the record independently of the motor when he desires to stop dictating for a moment only.

The switch and the pivoted mouth-piece supporting lever connected therewith, together with the supporting bracket and other parts illustrated in the drawing are well adapted to be made and sold independently of the other parts of the talking machine, and are capable of being applied to talking machines already in the hands of users and not originally provided with an automatic start and stop mechanism embodying my invention. My invention is therefore to be understood as covering such a mechanism whether manufactured and sold separately or whether manufactured and sold as a part of a complete talking machine.

What is claimed is:—

1. In a talking machine, the combination of a driving motor, a flexible speaking-tube provided with a mouth-piece, a bracket carried by the talking machine, a lever horizontally pivoted to the bracket and adapted to support the said mouth-piece, automatic means carried entirely by the bracket and serving to move the lever upward whenever the mouth-piece is removed, a motor start-and-stop device secured to the bracket independently of the lever below the point of attachment of the bracket to the talking machine, and a connection between the lever and the said device whereby the latter serves to start the motor when the lever is moved upward by the said automatic means and to stop the motor when the lever is moved downward by the weight of the mouth-piece.

2. In a talking machine, the combination of an electric driving motor, a flexible speaking-tube provided with a mouth-piece, a bracket carried by the talking machine, a lever horizontally pivoted to the bracket and adapted to support the said mouth-piece, a spring carried entirely by the bracket and serving to move the lever upward whenever the mouth-piece is removed, a switch in the circuit of the motor secured to the bracket independently of the lever below the point of attachment of the bracket to the talking machine, and a connection between the lever and the switch whereby the latter serves to close the motor circuit when the lever is moved upward by the said automatic means and to open the motor circuit when the lever is moved downwardly by the weight of the mouth-piece.

3. In a talking machine, the combination of a driving motor, a flexible speaking-tube provided with a mouth-piece, a bracket carried by the talking machine and having two

pairs of opposite upward projecting ears, a lever horizontally pivoted between its ends to the ears of one pair and movable between the ears of the other pair, the said lever being adapted at one end to support the said mouth-piece, automatic means carried entirely by the bracket and engaging the other end of the lever to move the first said end upward whenever the mouth-piece is removed, a motor start-and-stop device secured to the bracket independently of the lever, and a link connection between the last said end of the lever and the said device whereby the latter serves to start the motor when the lever is moved upward by the said automatic means and to stop the motor when the lever is moved downward by the weight of the mouth-piece.

4. In a talking machine, the combination of a driving motor, a flexible speaking-tube provided with a mouth-piece, a bracket carried by the talking machine and having two pairs of opposite upward projecting ears, a lever horizontally pivoted between its ends to the ears of one pair and movable between the ears of the other pair, the said lever being adapted at one end to support the said mouth-piece, an adjustable screw extending upward through the bracket between the second pair of ears and serving as a stop for the lever, automatic means carried entirely by the bracket and engaging the other end of the lever to move the first said end upward whenever the mouth-piece is removed, a motor start-and-stop device secured to the bracket independently of the lever, and a link connection between the last said end of the lever and the said device whereby the latter serves to start the motor when the lever is moved upward by the said automatic means and to stop the motor when the lever is moved downward by the weight of the mouth-piece.

5. In a talking machine, the combination of a driving motor, a record support driven by the motor, a sound-box movable across a record on the support, a bar provided with a scale for indicating the position of the sound-box, a mouth-piece flexibly connected with the sound-box, a bracket having a recess adapted to receive the said scale bar, means for clamping the bracket to the bar, a support on the bracket for the mouth-piece, a start-and-stop device on the bracket connected with the motor, and a connection between the said device and the mouth-piece support whereby the former serves to start and stop the motor when the mouth-piece is respectively removed from and placed upon the support.

6. In a talking machine, the combination of a driving motor, a record support driven by the motor, a sound-box movable across a record on the support, a bar provided with a scale for indicating the position of the

sound-box, a mouth-piece flexibly connected with the sound-box, a bracket having a recess adapted to receive the said scale bar, means for clamping the bracket to the bar, a lever horizontally pivoted to the bracket and adapted at its vertically movable end to support the mouth-piece, automatic means for moving the said end upward when the mouth-piece is removed, a start-and-stop device on the bracket connected with the motor, and a connection between the said device and the said lever whereby the former serves to start the motor when the lever is moved upward by the said automatic means and to stop the motor when the lever is moved downward by the weight of the mouth-piece.

7. An automatic start-and-stop mechanism for a talking machine having a horizontal scale bar, comprising in combination a bracket having a recess adapted to receive the scale bar of the talking machine, means for clamping the bracket to the bar, a support on the bracket for the mouth-piece of the talking machine, a start-and-stop device on the bracket adapted to be connected with the motor of the talking machine, and a connection between the said device and the mouth-piece support whereby the former serves when connected to the motor to start and stop the motor when the mouth-piece is respectively removed from and placed upon the support.

8. An automatic start-and-stop mechanism for a talking machine having a horizontal scale bar, comprising in combination a bracket having a recess adapted to receive the scale bar of the talking machine, means for clamping the bracket to the bar, a lever horizontally pivoted to the bracket, and adapted at its vertically movable end to support the mouth-piece of the talking machine, automatic means for moving the said end upward when the mouth-piece is removed, a start-and-stop device on the bracket adapted to be connected with the motor of the talking machine, and a connection between the said device and the lever whereby the former serves when connected to the motor to start the motor when the lever is moved upward by the said means and to stop the motor when the lever is moved downward by the weight of the mouth-piece.

9. An automatic start-and-stop mechanism for a talking machine, comprising in combination a bracket adapted to be detachably attached to the talking machine, a lever horizontally pivoted to the bracket and adapted to support the mouth-piece of the talking machine, automatic means carried entirely by the bracket and serving to move the lever upward whenever the mouth-piece is removed, a start-and-stop device secured to the bracket independently of the lever below the point of attachment of the bracket

to the talking machine, the said device being adapted to be connected to the motor of the talking machine, and a connection between the lever and the said device whereby the latter when connected to the motor serves to start the motor when the lever is moved upward by the said automatic means and to stop the motor when the lever is moved downward by the weight of the mouth-piece.

10. An automatic start-and-stop mechanism for an electrically driven talking machine, comprising in combination a bracket adapted to be detachably attached to the talking machine, a lever horizontally pivoted to the bracket and adapted to support the mouth-piece of the talking machine, a spring carried entirely by the bracket and serving to move the lever upward whenever the mouth-piece is removed, a switch connectible into the circuit of the motor of the talking machine and secured to the bracket independently of the lever below the point of attachment of the bracket to the talking machine, and a connection between the lever and the switch whereby the latter serves when connected into the motor circuit to close the circuit when the lever is moved upward by the said automatic means and to open the circuit when the lever is moved downward by the weight of the mouth-piece.

11. An automatic start-and-stop mechanism for a talking machine, comprising in combination a bracket adapted to be detachably attached to the talking machine and having two pairs of opposite upward projecting ears, a lever horizontally pivoted between its ends to the ears of one pair and movable between the ears of the other pair, the said lever being adapted at one end to support the mouth-piece of the talking machine, automatic means carried entirely by the bracket and engaging the other end of the lever to move the first said end upward whenever the mouth-piece is removed, a

start-and-stop device connectible to the motor of the talking machine and secured to the bracket independently of the lever, and a link connection between the last said end of the lever and the said device whereby the latter serves when connected to the motor to start the motor when the lever is moved upward by the said automatic means and to stop the motor when the lever is moved downward by the weight of the mouth-piece.

12. An automatic start-and-stop mechanism for a talking machine, comprising in combination a bracket adapted to be connected to the talking machine and having two pairs of opposite upward projecting ears, a lever horizontally pivoted between its ends to the ears of one pair and movable between the ears of the other pair, the said lever being adapted at one end to support the mouth-piece of the talking machine, an adjustable screw extending upward through the bracket between the second pair of ears and serving as a stop for the lever, automatic means carried entirely by the bracket and engaging the other end of the lever to move the first said end upward whenever the mouth-piece is removed, a start-and-stop device connectible to the motor of the talking machine and secured to the bracket independently of the lever, and a link connection between the last said end of the lever and the said device whereby the latter serves when connected to the motor to start the motor when the lever is moved upward by the said automatic means and to stop the motor when the lever is moved downward by the weight of the mouth-piece.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

FRANK L. CAPPS.

Witnesses:

R. H. ORMANET,
P. J. LUNNY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPHOPHONE PATENT.

TALKING MACHINE,
#1,188,744-----J. C. English,
Patented-June 27th, 1916.
Filed-March 24th, 1911.

J. C. ENGLISH.
TALKING MACHINE.
APPLICATION FILED MAR. 24, 1911.

1,188,744.

Patented June 27, 1916.

Fig. 1.

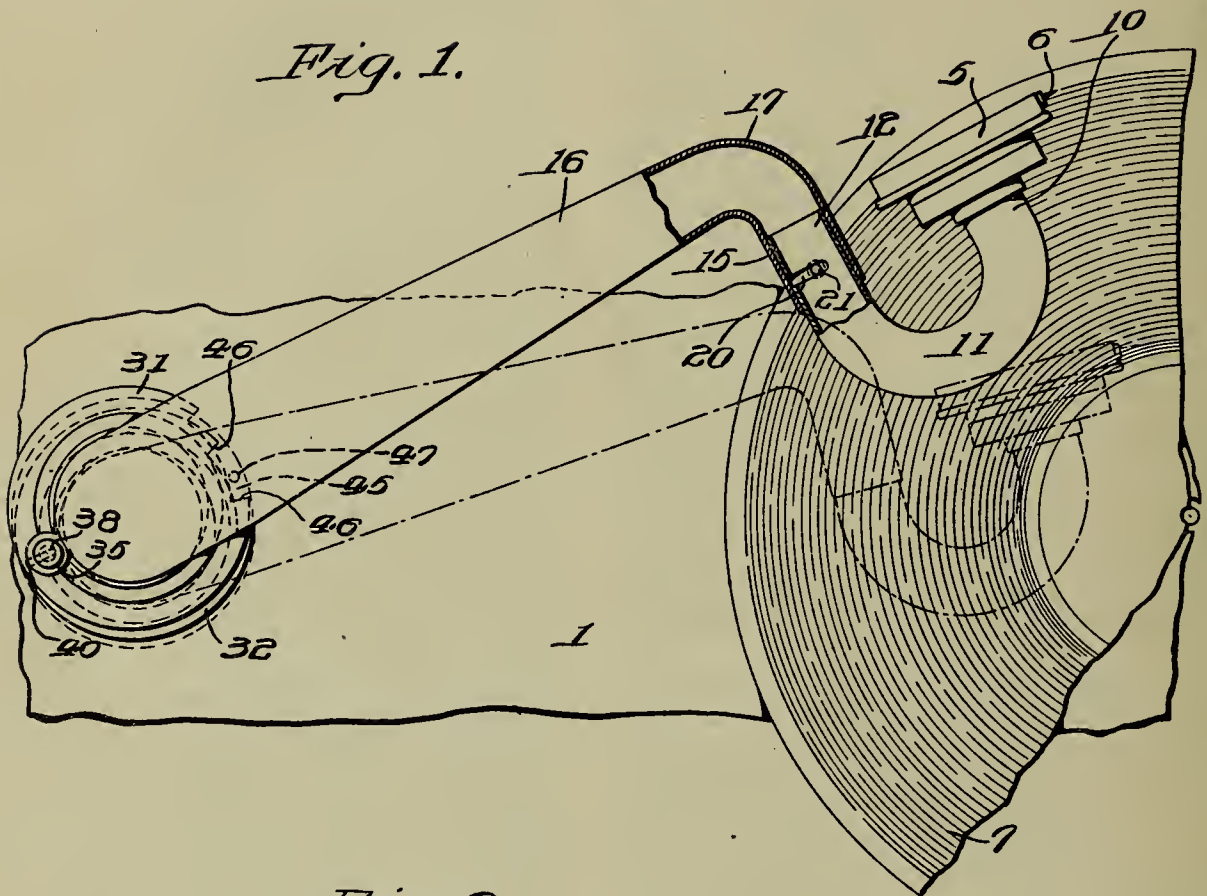
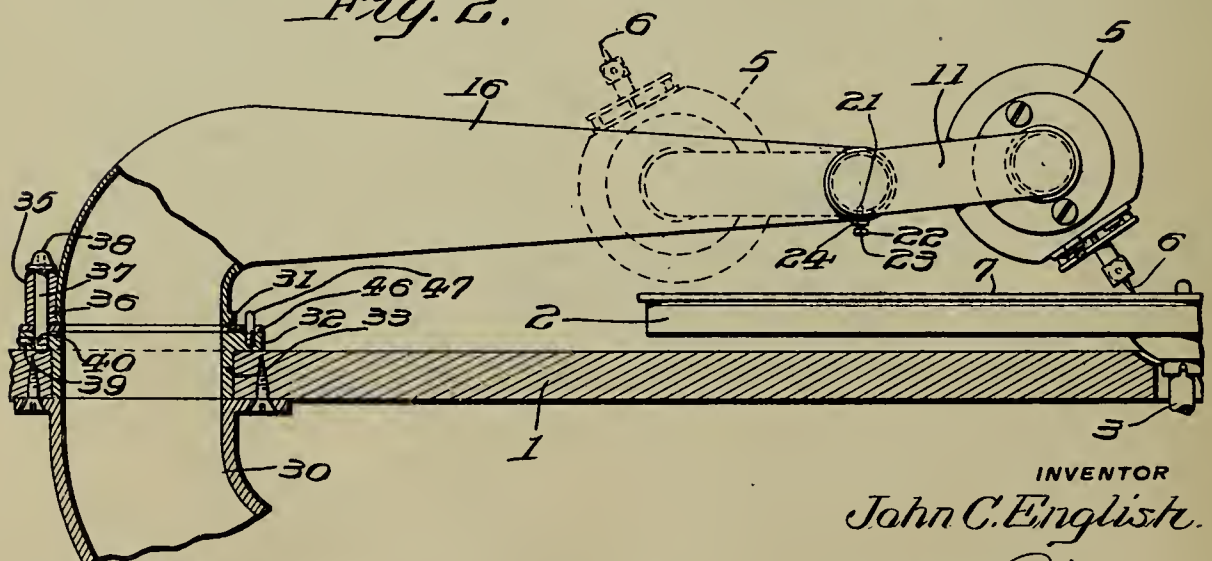


Fig. 2.



INVENTOR

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BY

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UNITED STATES PATENT OFFICE.

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TALKING-MACHINE.

1,188,744.

Specification of Letters Patent. Patented June 27, 1916.

Application filed March 24, 1911. Serial No. 616,664.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

This invention relates to talking machines, and more particularly to an improved tone arm and mounting therefor, and to an improved connection between a tone arm and a sound box.

The main objects of this invention are to provide a compact, simple and inexpensive mounting for a tone arm; to provide an improved connection between a sound box and a tone arm whereby the sound box may be inverted into an inoperative position to rest close to a turn-table and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary top plan view, partly in horizontal section, of a talking machine constructed in accordance with this invention; and Fig. 2 a fragmentary side elevation partly in vertical section of the same.

Referring to the drawings, one embodiment of this invention comprises a horizontal wall or support 1, which may be the top wall of an ordinary cabinet, such as is generally used in talking machines. Arranged above this support 1 is the usual horizontal turn-table 2 which is rotatably mounted upon the upper end of a spindle 3 projecting freely through the support 1 and actuated by the usual or any suitable mechanism (not shown) arranged beneath the wall 1.

Arranged above the turn-table 2, to cooperate therewith, is any ordinary or suitable sound box or sound reproducer 5, provided with the usual stylus 6 arranged to engage a sound record 7 mounted as usual upon the turn-table 2. For supporting the sound box 5 to swing across the face of the record 7, the sound box is preferably connected to the outer open free end or arm 10 of a tubular sound conveyer or mounting 11 with which it communicates, and which is preferably curved longitudinally, the longitudinal axis of which being preferably substantially U-shaped. The inner end or arm 12 of this curved sound conveyer 11 is

open and externally cylindrical in shape and is preferably slightly longer than the outer arm. This inner cylindrical end 12 telescopes snugly but rotatably in the internally cylindrical laterally projecting outer free end 15 of a tone arm 16.

The major portion of the tone arm 16 preferably tapers outwardly and the longitudinal axis of this major portion is preferably straight and arranged in a horizontal plane. The longitudinal axis of the outer cylindrical end 15 of the tone arm preferably extends substantially horizontally and at right angles to the longitudinal axis of the major portion of the tone arm, the outer cylindrical portion 15 being connected to the smaller end of the major portion 16 by a tubular portion 17 curved longitudinally through an arc of substantially 90°.

For securing the inner end 12 of the U-tube 11 rotatably within the outer end of the tone arm 15, the inner end of the sound conveyer 11 is provided with a segmental slot 20 extending partially around the portion of the tube 11 surrounded by the cylindrical end 15 of the tone arm. A pin or stop 21 is threaded through the cylindrical outer portion 15 of the tone arm and its inner end projects into the slot, holding the U-tube 11 against movement longitudinally of the cylindrical portion 15 of the tone arm, but permitting the free rotation thereof within the limits of the slot. The outer end of this stop 21 is preferably provided with a head 22 slotted as at 23 to receive a screw driver, and a boss 24 may be provided on the outer surface of the cylindrical portion 15 of the tone arm to receive the stop 21. The segmental slot 20 is so proportioned and arranged that when the stylus is in engagement with the record 7, the sound box will be free to move vertically in either direction sufficiently to follow any irregularities in the record or record support.

For supporting the sound box when in an inverted inoperative position the segmental slot 20 is so proportioned and arranged that when the sound box is inverted into the position shown in dotted lines in Fig. 2, the inner end of the pin 21 will engage against the corresponding end wall of the slot 20 to maintain the sound box and its supporting U-tube 11 with their longitudinal axes substantially in the horizontal plane of

the longitudinal axis of the tapering major portion 16 of the tone arm. The construction is such that the sound box is but slightly removed from the face of a record 7 upon the turn-table when the sound box is supported by the pin 21 and is in its inoperative inverted position.

For supporting the tone arm to swing about a fixed vertical axis and for delivering sound waves downwardly through the larger end of the tone arm through the support 1 and into the inlet end of the usual or any suitable sound amplifier 30 depending downwardly from the wall 1, the larger part of the major portion 16 of the tone arm is curved rearwardly and downwardly through an arc of substantially 90° and terminates in a flat open delivery end forming a circular outlet. This delivery end is provided with a flat annular horizontal circular flange 31 rigid and flush therewith and projecting outwardly therefrom. This flange 31 rests slidably upon the upper surface of a corresponding flat horizontal annular flange 32 integral or rigid with and projecting outwardly from the upper end of a hollow, externally and internally cylindrical bushing 33 extending tightly through an aperture provided therefor in the support 1. The lower end of this bushing preferably abuts against the upper end of a sound amplifier 30. The internal diameter of the bushing 33 is preferably substantially equal to the internal diameter of the larger end of the tone arm 16.

Arranged upon the outer or rear side of the larger end of the tone arm 16 is a boss 35 projecting upwardly from the flange 31 of the tone arm and rigidly secured thereto and to the adjacent outer surface of the tone arm by brazing, or in any suitable manner. This boss is provided centrally with a vertical cylindrical aperture 36, extending through the boss and through the flange 31, in which rotatively engages a pivot 37, the upper end of which projects above the boss and is preferably provided with a head 38 rigid therewith engaging the upper end of the boss. The lower end of the pivot 37 engages snugly in an aperture 39 in the flange 32 of the bushing 33 and is preferably held in fixed position longitudinally by a pin 40 extending horizontally through the flange 32 and into the pivot 36. By this construction, the tone arm is restrained to swing in a horizontal plane about a fixed vertical axis coincident with the longitudinal axis of the pivot 37, the lower horizontal surface of the flange 31 sliding across the upper horizontal surface of the fixed flange 32 and the arrangement is such that when the sound box is substantially in the center of its path across the record in reproducing sounds, the opening in the larger end of the tone arm will regis-

ter with the opening through the bushing 33.

To limit the movement of the tone arm about the pivot 36, the flange 31 of the tone arm is provided opposite the pivot with a segmental recess 45 concentric with the pivot and having abrupt end walls 46 arranged radially with respect to the pivot. In this recess is located a vertical pin or stop 47, the lower end of which is threaded into the fixed flange 32. As the tone arm is oscillated about its pivot 36, the end walls 46 of the recess 45 engage alternately against the pin 47 to limit the movement of the tone arm in opposite directions respectively. The recess 45 is proportioned to permit of the necessary movement of the tone arm when in operation.

Although only a single embodiment of this invention has been illustrated, it is obvious that the invention is not limited to the particular construction shown, but might be embodied in other forms without departing from the spirit of the invention, or the scope of the appended claims.

Having thus fully described this invention, I claim and desire to protect by Letters Patent of the United States:

1. In a talking machine, the combination with a hollow tone arm mounted at one end to swing about a fixed axis and having its outer portion longitudinally curved and terminating in a laterally projecting open end, of a substantially U-shaped tubular sound conveyer communicating with and rotatably connected with said end coaxially therewith, a sound box carried by and communicating with the outer end of said tubular conveyer, said sound box and said tubular conveyer being invertible with respect to said tone arm into an inoperative position facing said tone arm, and means to hold said sound box stationary with respect to said tone arm when in said inoperative position.

2. In a talking machine, the combination with a hollow tone arm having a laterally projecting end, of a substantially U-shaped tubular sound conveyer rotatably telescoping at one end with said end of said tone arm, a sound box carried by and communicating with the other end of said U-shaped sound conveyer, and means between the adjacent ends of said arm and conveyer to limit the movement of said conveyer and support it with respect to said tone arm, said sound box being invertible with respect to said tone arm into an inoperative position at the limit of its movement in one direction and positioned laterally with respect to said tone arm.

3. In a talking machine, the combination with a tone arm having a longitudinally curved and laterally projecting free end, of a longitudinally curved tube having one end connected to said free end to oscillate co-

axially therewith, and a sound reproducer carried by the other end of said tube and invertible on said tube into an inoperative position in a horizontal plane with said tone arm.

4. In a talking machine, the combination with a hollow tone arm having a longitudinally curved outer portion terminating in an internally cylindrical outer end, of a longitudinally curved tubular sound conveyer having an externally cylindrical end engaging snugly but rotatably in said end of said tone arm, a sound box carried by and communicating with the other end of said conveyer, and means between the adjacent ends of said tone arm and said conveyer for holding said sound box in an inoperative position, said sound box being arranged in a position horizontally opposite and facing said tone arm when in said inoperative position.

5. A talking machine comprising a hollow tone arm having a downwardly turned open delivery end, a hollow support for said arm against which said end slidably engages, and a pivot between said end and said support arranged eccentric with respect to said end, and in alinement with said arm upon which said arm is mounted to oscillate.

6. A talking machine comprising a tone arm having an open delivery end provided with an outwardly extending flange, a hollow support slidably engaged by said end and a pivot extending through said flange and into said support for restraining said arm to swing about a fixed axis, said flange being provided opposite said pivot with a recess and said support being provided with a stop engaging in said recess to limit the movement of said arm about said pivot.

7. In a talking machine, the combination with a rotary record support, of a hollow tone arm having an open delivery end, a hollow support upon which said delivery end is mounted to oscillate upon an axis eccentric with respect to said end, and sound reproducing means mounted upon and communicating with said tone arm and arranged to be carried by said tone arm across said record support, the delivery end of said tone arm being arranged to register with the opening in said hollow support when said sound reproducing means is substantially at the central portion of its operative path across a record mounted on said record support, and the joint between said support and said tone arm being maintained in contact by the weight of the latter.

8. In a talking machine, the combination with a hollow support providing a bearing, of a tone arm mounted to swing upon said support and having a flange pressed into contact with said support by the weight of the free end of said tone arm, and a pivot eccentrically disposed at the discharge end

of said tone arm and extending through said flange and support.

9. In a talking machine, the combination with a hollow support having a flange, of an oscillatory tone arm having a flange, the face of which is engaged with the face of the flange of said support by the weight of the free end of said tone arm, and means pivotally securing said support and tone arm together on an axis eccentric to the axis of said tone arm at that end of the tone arm which engages said support.

10. In a talking machine, the combination with a tubular tone arm having a longitudinally curved and laterally projecting free open end, of a substantially U-shaped tubular sound conveyer having an open end rotatably telescoping with said first mentioned open end, and a sound box carried by and communicating with the other end of said tubular conveyer, said conveyer and sound box being invertible to bring said sound box into an inoperative position facing said tone arm and substantially in a horizontal plane therewith.

11. In a talking machine, the combination with a hollow tone arm having an open delivery end, of a member provided with an opening cooperating with said end, said arm being mounted to oscillate about an axis spaced from the longitudinal axis of said end and in alinement with said arm.

12. In a talking machine, the combination with a rotary record support, of a hollow movable tone arm provided with an outlet, relatively stationary means provided with an inlet cooperating with said outlet, and sound reproducing means carried by and communicating with said arm and arranged to move with said arm across said record support, said arm being pivoted to swing in a fixed path about a fixed axis spaced from the center of said outlet in a direction away from said sound reproducing means, and in alinement with said arm.

13. In a talking machine, the combination of a hollow tone arm having an angularly disposed open delivery end, of a hollow support for said arm against which said delivery end slidably engages, a pivot between said delivery end and said support arranged eccentric with respect to said end upon which said arm is mounted to oscillate, and a stop to limit the motion of said arm with respect to said support.

14. In a talking machine, the combination with a rotary record support, of a hollow movable tone arm provided with an outlet disposed in angular relation with respect thereto, a relatively stationary support means provided with an inlet cooperating with said outlet, sound reproducing means carried by and communicating with said arm and arranged to move with said arm across said record support, said arm being

pivoted to swing about a fixed axis spaced from the center of said outlet, said outlet being arranged to register with said inlet when said sound reproducing means is substantially midway of its operative path across said support, and means to limit the amount of movement of said tone arm about said pivot.

15. A talking machine comprising a hollow tone arm having an open delivery end extending at an angle to the axis of the major portion of said tone arm, a hollow support for said arm against which said delivery end slidably engages, and a pivot between said end and said support arranged eccentric with respect to said end and in alinement with the axis of the major portion of said arm and upon which said arm is mounted to oscillate.

16. In a talking machine, the combination with a hollow tone arm having at its free end an opening facing laterally, a sound conducting member having one end in telescopic relation with respect to said opening and freely rotatable with respect to said arm and its other end out of axial alinement with said first-mentioned end, a sound box mounted on said free end of said member, said sound conducting member and said sound box being invertible with respect to

said arm to an inoperative position of said sound box, and means between said tone arm and said conducting member both for retaining said member in telescopic relation with respect to said tone arm, and for limiting the extent of the relative movement of said member.

17. In a talking machine, the combination with a hollow tone arm having its free end facing laterally, of a substantially U-shaped sound conducting member having one end in telescopic relation with said free end of said tone arm and freely rotatable with respect to said tone arm, a sound box mounted on the free end of said member, said sound conducting member and said sound box being invertible with respect to said arm to an inoperative position of said sound box, and means between said tone arm and said conducting member both for holding said member in telescopic relation with respect to said tone arm, and for limiting the extent of relative movement of said member.

In witness whereof I have hereunto set my hand this 17th day of March 1911.

JOHN C. ENGLISH.

Witnesses:

FRANK B. MIDDLETON, Jr.,
CHARLES F. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

HOLDER FOR TALKING MACHINE RECORDS .
#1,188,872-----W. H. Woerheide,
Patented-June 27th, 1916.
Filed-October 27th, 1913.

W. H. WOERHEIDE.
 HOLDER FOR TALKING MACHINE RECORDS.
 APPLICATION FILED OCT. 27, 1913.

1,188,872.

Patented June 27, 1916.

3 SHEETS—SHEET 1.

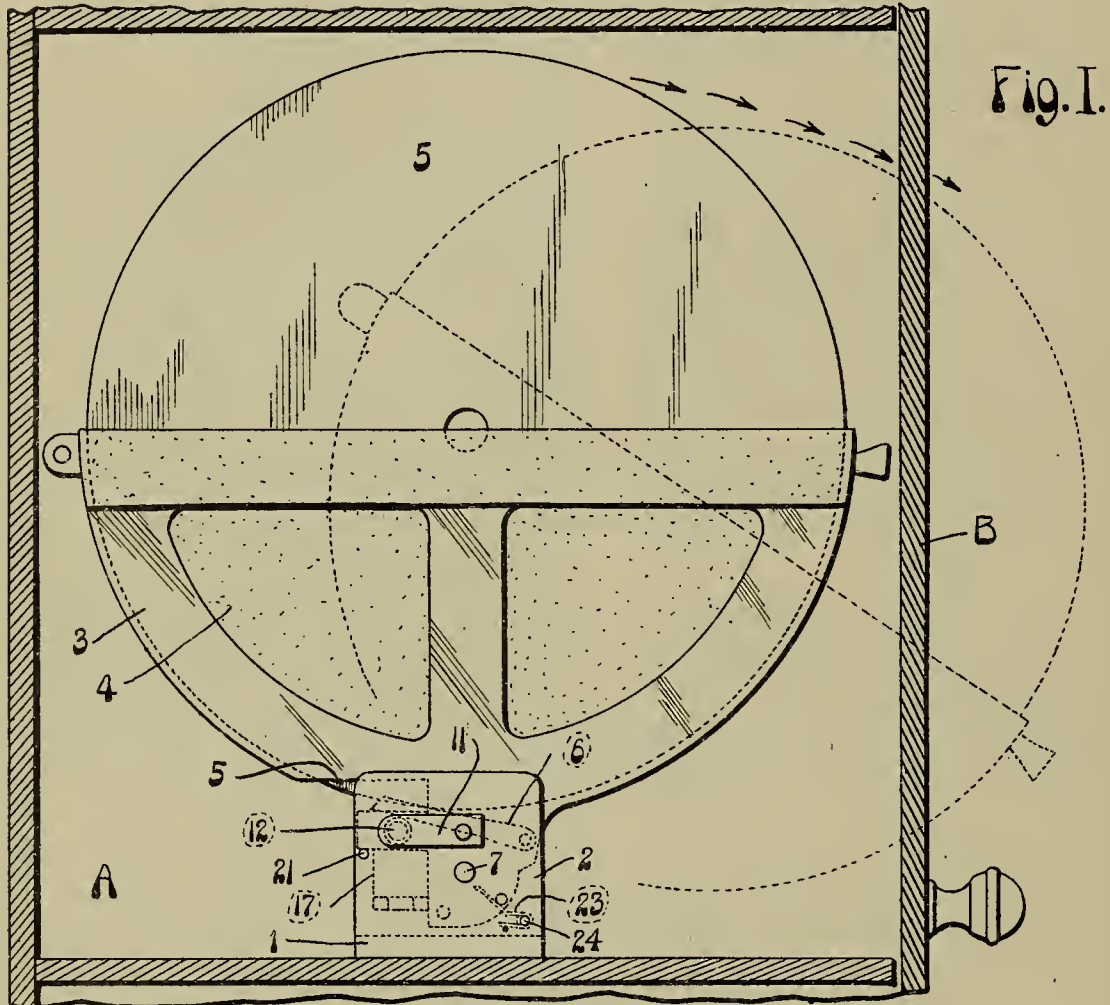


Fig. I.

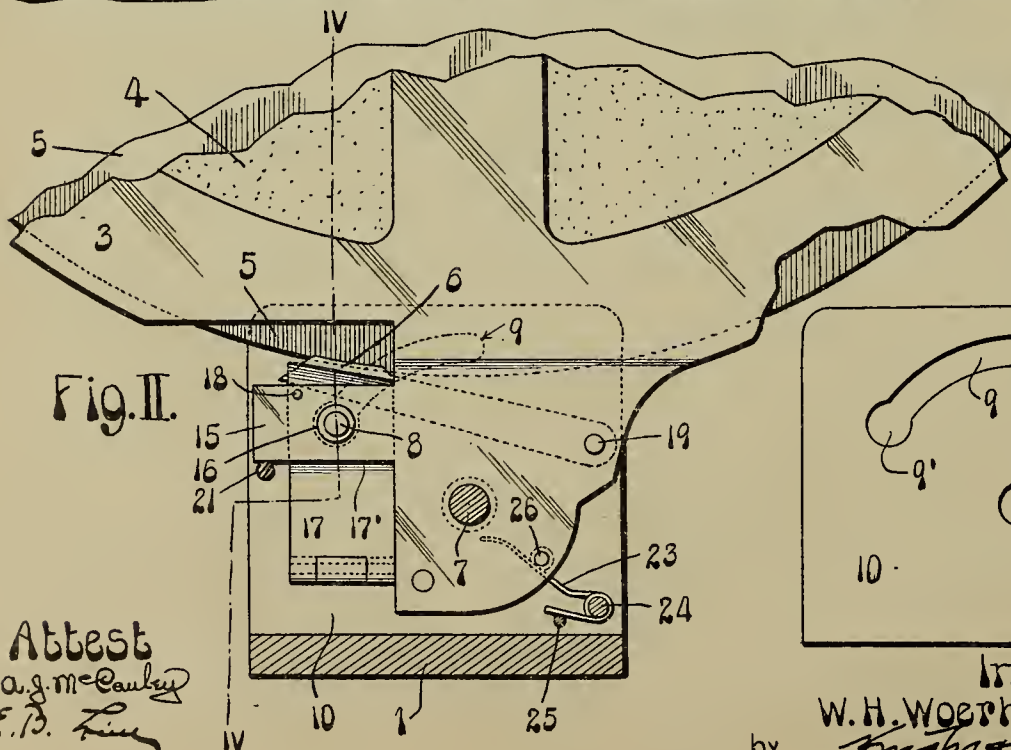
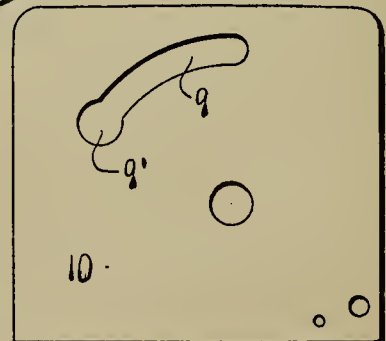


Fig. II.

Fig. III.



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 by *Knight & Cook* Att'ys.



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 APPLICATION FILED OCT. 27, 1913.

1,188,872.

Patented June 27, 1916.

3 SHEETS—SHEET 2.

Fig. IV.

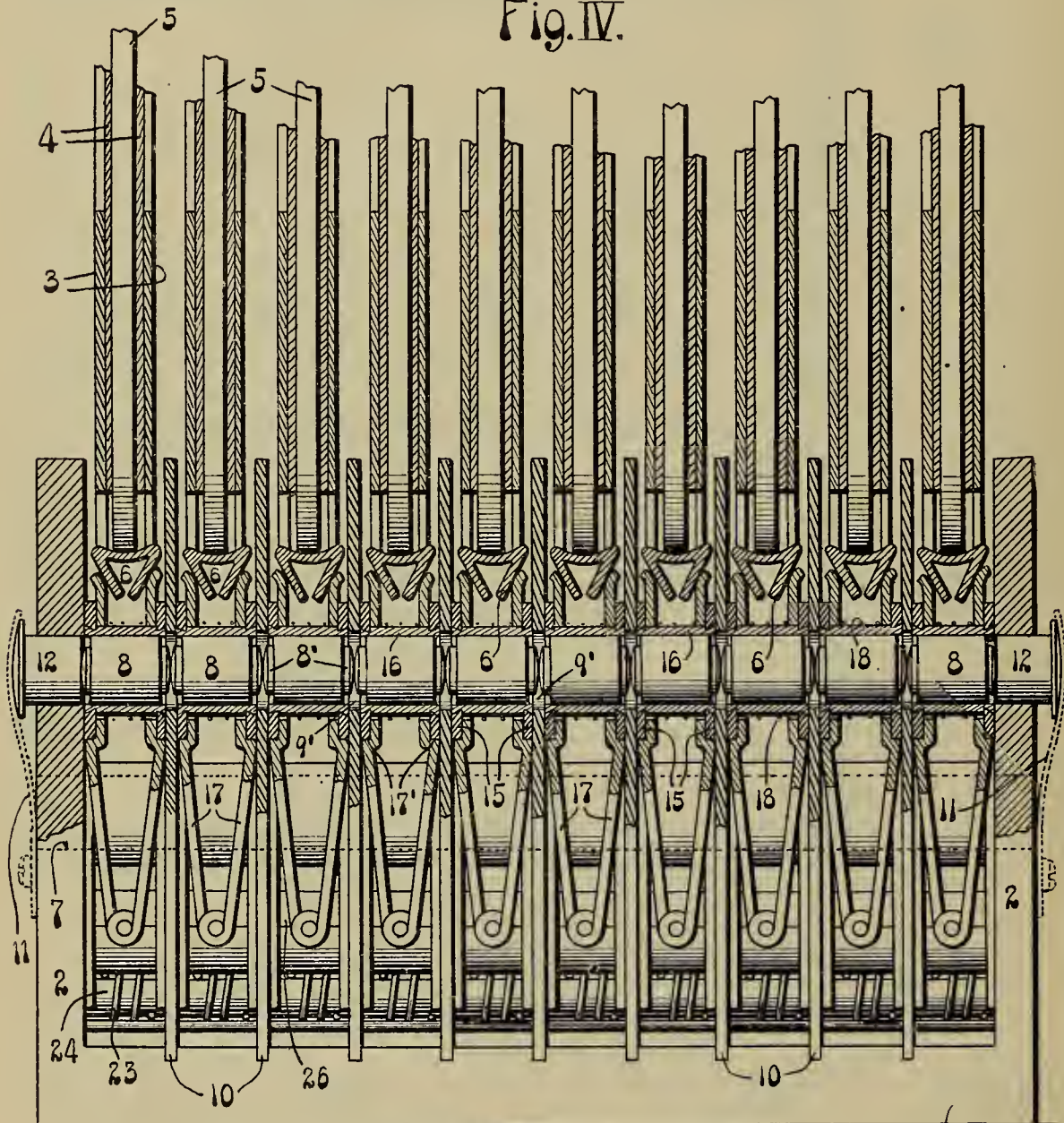
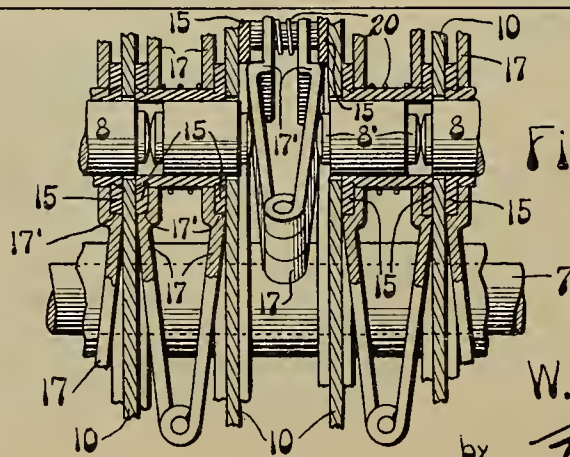


Fig. V.



Attest

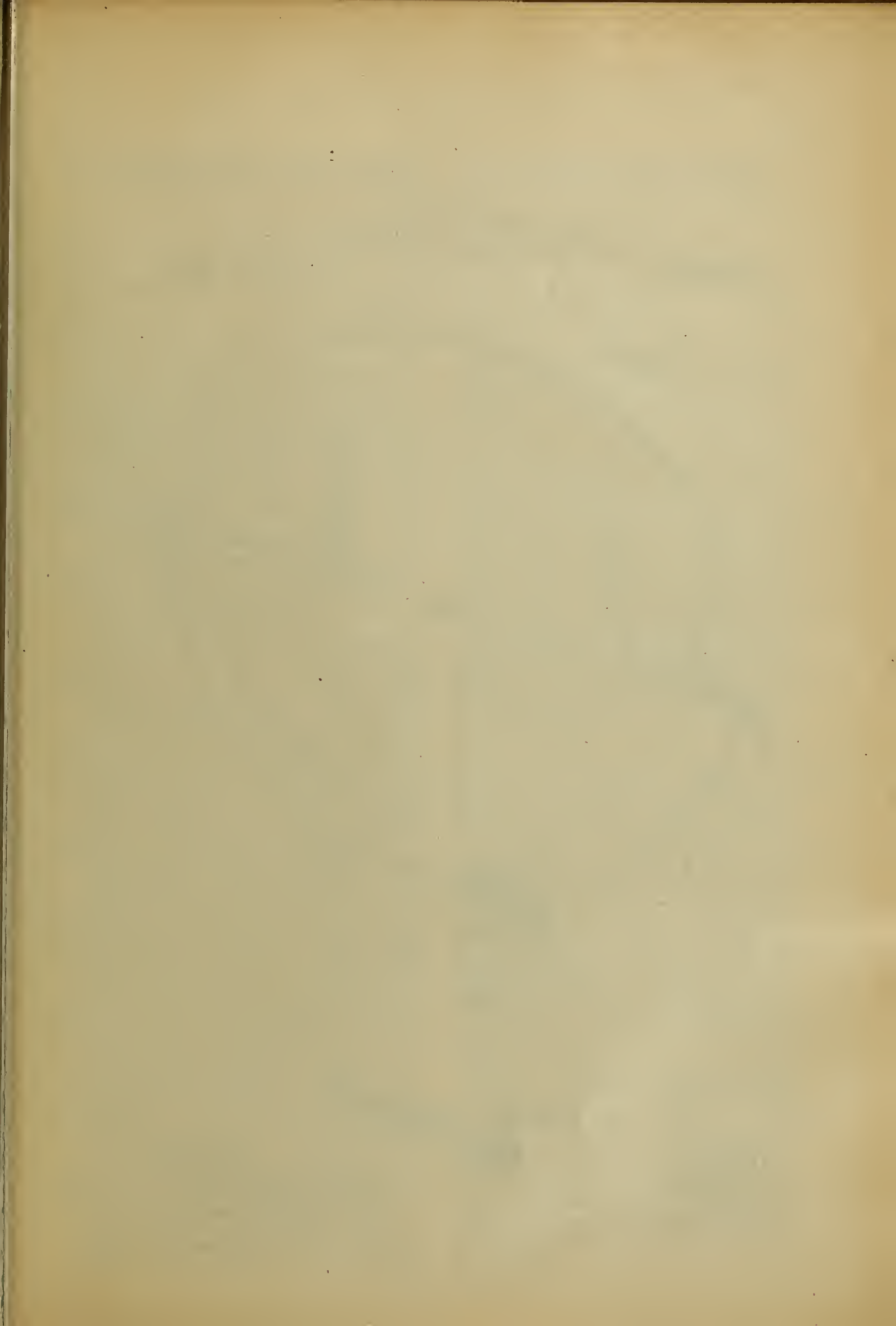
a. j. mcgawley
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 HOLDER FOR TALKING MACHINE RECORDS.
 APPLICATION FILED OCT. 27, 1913.

1,188,872.

Patented June 27, 1916.
 3 SHEETS—SHEET 3.

Fig. VI.

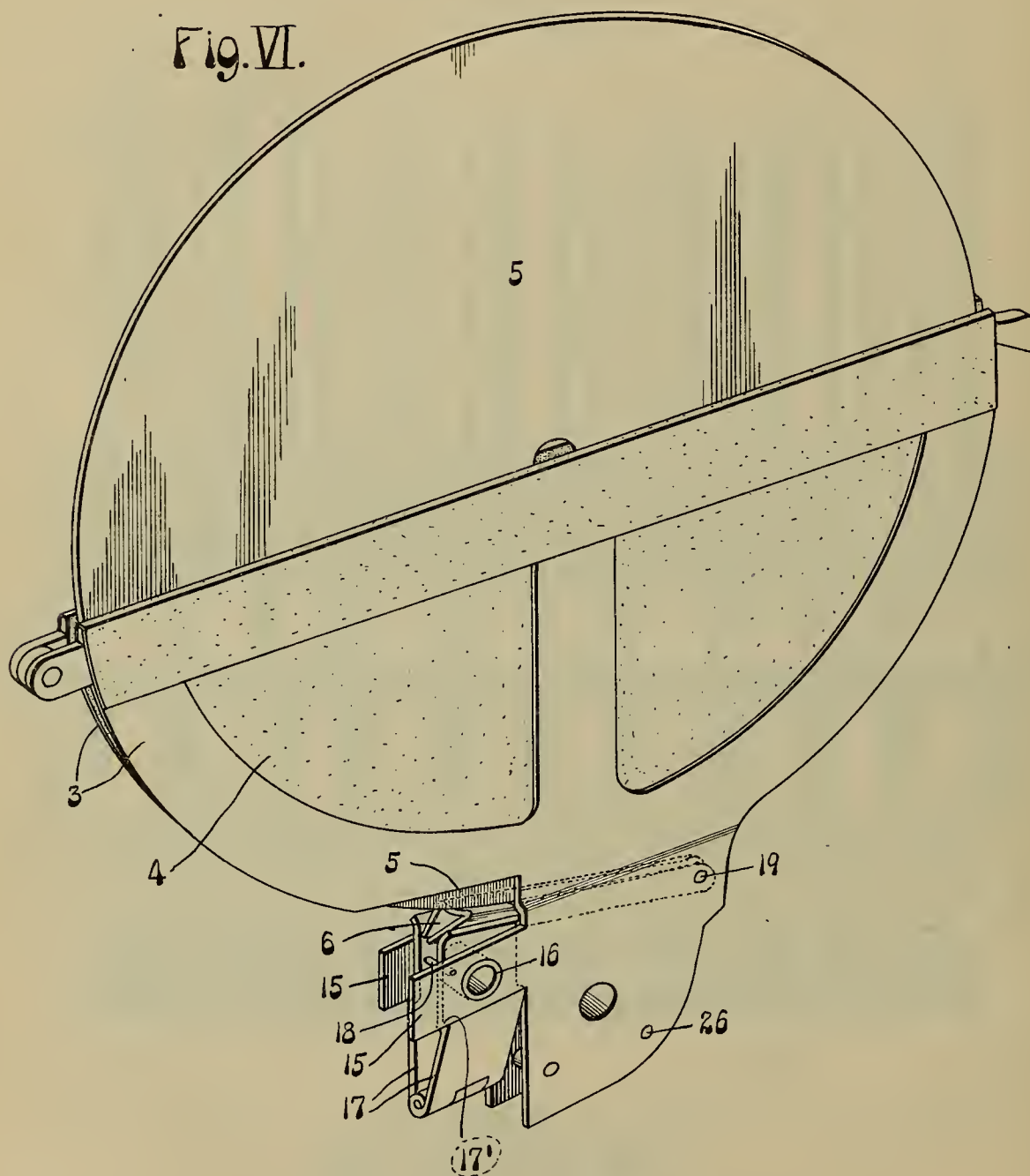
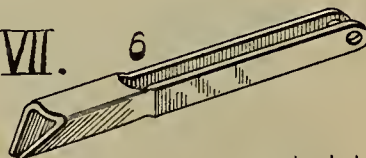


Fig. VII.



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 by *Knights & Cook*
 Attys

UNITED STATES PATENT OFFICE.

WILLIAM H. WOERHEIDE, OF ORANGE, NEW JERSEY.

HOLDER FOR TALKING-MACHINE RECORDS.

1,188,872.

Specification of Letters Patent.

Patented June 27, 1916.

Application filed October 27, 1913. Serial No. 797,440.

To all whom it may concern:

Be it known that I, WILLIAM H. WOERHEIDE, a citizen of the United States of America, residing in Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Holders for Talking-Machine Records, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to holders for talking machine records, the object being to produce a holder from which the records may be taken only one at a time, and which requires replacement of a removed record before removal of another record.

Talking machine records are commonly placed in cabinets or racks, from which the records may be taken, as desired, and be placed at the will of the user, either immediately following the use of a record, or after a number of records have been removed and used. This practice is highly objectionable, particularly, for two reasons: Firstly, if provision is made in the cabinet, rack, or other holder for the records for keeping them according to some prearranged plan, as by an index system, there is great liability of the original arrangement of the records being deranged, owing to accident or confusion in the return of the records to the holder from which they were taken. Secondly, the records, if taken from the holder more than one at a time and laid aside after being used, are liable to be injured when laid one upon another, or laid upon some object that would be injurious to the delicate surfaces of the records. By my improvement, I provide a record holder so constructed as to make it imperative that each and every record taken from the holder be returned to its original place in the holder, previous to the removal of another record, and there is absolutely no opportunity for disorder in the arrangement of a collection of records, and absence of occasion for injury to the records, as is possible in the use of record holders permitting the removal of a number of records before replacing them in the holder from which they were taken.

In the use of the preferred form of my invention, the records are placed, singly, in movable holders and may be removed there-

from by first shifting a holder to an abnormal position. Primarily all of the holders are unlocked and any one of them may be moved from its normal position to permit the removal of the record therein, but when such movement is imparted to such holder, the remaining holders are automatically locked in their normal position. Therefore, any one of the records may be positioned for removal but after a selection has been made and while the selected record holder occupies its abnormal position, no other record can be removed. When the selected record is removed from its holder, the latter is automatically locked and cannot be restored to normal position until the removed record is replaced. When a record is replaced in its holder the latter is automatically unlocked and may be readily shifted back to its normal position, and such movement will automatically unlock all of the remaining holders, thereby permitting any one of the holders to be selected and the removal of the record therefrom.

From the foregoing it will be noted that four different features are present in the preferred form of my invention. First, all of the record holders are normally unlocked and any one of them may be shifted to permit the removal of a record. Second, when a record holder is shifted from its normal position the remaining record holders are automatically locked. Third, when a record is removed from a holder, the latter is automatically locked in an abnormal position, so that all of the holders are then locked and no other record can be removed. Fourth, when a record is replaced, its holder is automatically unlocked and may be restored to normal position, thereby unlocking the remaining holders and permitting the user to make a new selection.

It will be noted that the user cannot make a mistake in replacing a record, the only accessible holder being the one from which the record was withdrawn. Aside from the advantage of positively maintaining the original arrangement of the records, there is also the advantage of compelling the user to replace each record, instead of permitting the delicate records to accumulate where they are liable to be injured by contact with each other or by useless and careless handling.

Figure I is a side elevation of my record holder, the cabinet being shown in section. Fig. II is an enlarged vertical section, showing a portion of one of the record holders and parts associated therewith. Fig. III is a detail view of one of the fixed partitions. Fig. IV is an enlarged vertical section, taken approximately on the line IV—IV, Fig. II. Fig. V is an enlarged fragmentary detail view, showing one of the record holders moved from its normal position, and the remaining record holders locked in normal positions. Fig. VI is a perspective view of one of the record holders. Fig. VII is a perspective view of the spreader through the medium of which a record holder is unlocked when a record is replaced.

In the accompanying drawings: A designates a cabinet provided with a door B. Record holders, which will be presently described, are supported by a base member 1 arranged within the cabinet A and having upstanding side walls 2. Each record holder is preferably in the form of a cradle or semi-circular receptacle, comprising side frames 3 and a felt lining 4 fitted to said side frames. The record holders are open at the top to receive the records 5, and the lower edges of the records rest upon spreaders 6 having certain functions to be hereinafter described. The side frames of each record holder are suitably connected together and the extended lower portions of these side frames serve as a housing for locking devices to be described.

7 designates a pivot rod passing through all of the record holders and supported by the upstanding side walls 2 of the base member 1. All of the record holders are pivotally supported by the pivot rod 7 and any one of the record holders may be turned on the pivot rod 7 from its normal position, shown in full lines, Fig. I, to an abnormal position shown by dotted lines, Fig. I. It will be noted that when the record holders occupy their normal position in the cabinet the records cannot be removed, but when a holder is shifted to the position seen in dotted lines the record may be readily lifted from said holder.

Latch members, in the form of a row of latch bolts 8 are slidably fitted to the record holders, said latch bolts having reduced ends 8', shown most clearly in Fig. IV. The latch bolts abut against each other and their reduced ends project into arcuate slots 9 formed in fixed partitions 10. The primary function of these latch bolts is performed when one of the record holders is shifted from its normal position, the remaining record holders being then automatically locked in their normal position, as will be presently described. The means for shifting the latch bolts comprises springs 11, secured to the

upstanding base members 2 and pressing against thrust bolts 12 abutting against the endmost latch bolts 8. These springs normally force the latch bolts against each other. The reduced ends 8' of the latch bolts 8 may be moved into the reduced portion of the arcuate slots 9 (Fig. III), and the larger body portion of said bolts may be projected into the enlargement 9' of said arcuate slot. Each record holder carries one of the latch bolts and when a record holder occupies its normal position its latch bolt registers with the enlargement 9' of the arcuate slots 9.

It will now be understood that any one of the record holders may be shifted from its normal position for the reason that the reduced ends of its latch bolt may be moved into the narrow portion of the slot 9. But when one of the latch bolts is carried away from its normal position, the remaining bolts are shifted into the enlarged ends 9' of the arcuate slots, the springs 11 serving as the means for shifting the latch bolts. Therefore, when one of the record holders is shifted to carry its latch bolt away from the remaining latch bolts, the latter are automatically projected into the fixed partition members 10 to lock the remaining record holders in their normal position, see Fig. V.

The shifted record holder is not locked in its abnormal position until the record is removed therefrom and it is then locked through the medium of the following mechanism: Each record holder is provided with wings 15, and a sleeve 16 connecting said wings the corresponding latch bolt 8 being slidably fitted to said sleeve. A pair of diverging plates 17 hinged together at their lower ends, are loosely supported by the sleeve 16. A small guide pin 18 connecting the wings 15, passes through the upper portions of the diverging plates 17. The plates 17 are formed with shoulders 17' which normally lie directly below the lower edges of the wings 15 so a substantially smooth surface is formed at the junction of the lower edges of the wings 15 and the diverging plates 17. Light springs 20 surrounding the sleeves 16 tend to spread the diverging plates 17, and these plates are at times positively separated by the spreader members 6 arranged between the upper ends of said plates. Each spreader 6 is in the form of an arm pivoted at 19 and having a wedge shaped head which supports the record in the record holder.

When one of the record holders is shifted from its normal position, the latch bolts 8 adjacent to said holder are pushed against the diverging plates 17 of the moved holder, and the pressure of these latch bolts tends to push said diverging plates 17 toward each other. The diverging plates 17 are

prevented from partaking of such movement while the record is contained in the holder, for the reason that the record holds the spreader 6 located at this time between
 5 said diverging plates. When the record is removed the spreader is freed and the pressure of the adjacent latch bolts forces the diverging plates toward each other, as seen at the center of Fig. V. The object of this
 10 latter operation is to prevent an empty record holder from being restored to normal position. When the diverging plates are moved toward each other the adjacent latch bolts are located directly below the wings
 15 15, which form part of the shifted holder, and if an attempt is made to restore the holder, the wings 15 will strike the adjacent latch bolts 8 (Fig. V). When the record is restored to its holder the spreader 6 is
 20 engaged by the record and forced between the diverging plates to separate said plates, thereby locating the shoulders 17' of said plates directly below the lower edges of the wings 15. A substantially smooth inclined surface is then presented to the
 25 adjacent latch bolts, the lower edges of the wings 15 being covered by the diverging plates, and the record holder may be restored to its normal position. This will locate all of the parts in their normal position
 30 (Fig. IV) and any one of the record holders may then be shifted to permit the removal of a selected record.

Generally stated, the features found in my
 35 mechanism are as follows: Any record holder and its latch bolt may be shifted to an abnormal position, with the result of releasing all of the other latch bolts and permitting movement of said latch bolts by the
 40 springs 11 into the enlargements 9' of the arcuate slots 9 in the fixed partitions. This locks all of the record holders, excepting the shifted holder, and it is eventually locked in an abnormal position upon the removal of
 45 the record. When the record is restored to its holder the proper spreader 6 is forced between the diverging plates to unlock said record holder, and when the record holder is restored the remaining record holders are
 50 unlocked by separating the adjacent locking bolts through the medium of the diverging plates 17.

To hold the record holders in a predetermined normal position, in which the latch
 55 bolts are alined or arranged in a straight row, I provide a stop rod 21 (Fig. I) engaged by the wings 15 of all of the record holders, and springs 23 for forcing said wings against the stop rod. The springs 23
 60 are held by rods 24 and 25 and the free ends of said springs bear against rods 26 carried by the record holders.

While I have described my invention as a holder for talking machine records, it is to

be understood that I do not thereby limit
 65 myself to its use for this class of objects. My holder is primarily intended for the use set forth but may be utilized in holding various other objects for which the structure
 70 of the holder is suited.

I claim:—

1. A device of the character described comprising a series of holders, each of which is movable from a normal position to permit the removal of its contents, a series of abutting latch members movable in said holders, and means in the holders for moving
 75 said latch members to lock the remaining holders when one of them is moved to an abnormal position. 80

2. A device of the character described comprising a series of holders, each of which is movable from a normal position to an abnormal position to permit the removal of its contents, a series of latch members slidable in said holders, said latch members being operable to lock certain of said holders when one of the latch members is moved from its normal position relative to the remaining latch members, each of said latch
 85 members being movable with the corresponding holders to permit the remaining latch members to lock the remaining holders when one of the holders is moved to an abnormal position. 95

3. A device of the character described comprising a series of pivoted holders, each of which is movable from a normal position to an abnormal position to permit the removal of its contents, a row of coöperable latch members slidable in said holders, means tending to hold said latch members in engagement with each other, each of said latch members being movable with one of said holders to permit said means to shift the
 100 remaining latch members to their operative positions when one of said holders is moved to an abnormal position. 105

4. A device of the character described comprising a series of pivoted holders, each
 110 of which is movable from a normal position to an abnormal position to permit the removal of its contents, a row of abutting latch members slidable in said holders, springs tending to hold said latch members
 115 in engagement with each other, each of said latch members being movable with one of said holders to permit said springs to shift the remaining latch members to their operative positions when one of said holders
 120 is moved to an abnormal position.

5. A device of the character described comprising a series of holders, each of which is movable from a normal position to an abnormal position to permit the removal of
 125 its contents, a series of locking members carried by said holders, a series of fixed members arranged between said holders adapted

to receive said locking members, said locking members being ineffective when all of the holders occupy their normal position, and means whereby said locking members
5 are operated to lock the remaining holders in normal positions in response to a movement of one of said holders.

6. A device of the character described comprising a series of holders each of which
10 is movable from a normal position to an abnormal position to permit the removal of its contents, a series of locking members carried by said holders, a series of fixed members arranged between said holders, each of
15 said fixed members being provided with a slot having an enlargement adapted to receive an adjacent locking member, said locking members being ineffective when all of the holders occupy their normal position,
20 and means for operating said locking members in response to a movement of one of said holders whereby the remaining holders are locked in their normal positions.

7. A device of the character described
25 comprising a series of holders, each of which is movable from a normal position to an abnormal position to permit the removal of its contents, and means for automatically locking any one of said holders in its abnormal position upon the removal of its
30 normal position upon the removal of its

contents; said means including yieldable members carried by said holders, and spreaders for operating said yieldable members.

8. A device of the character described comprising a series of holders, each of which
35 is movable from a normal position to an abnormal position to permit the removal of its contents, and means for automatically locking any one of said holders in its abnormal position upon the removal of its
40 contents; said means including yieldable members carried by said holders, and spreaders for operating said yieldable members, said spreaders being operable through the
45 medium of the contents of said holders.

9. A device of the character described comprising a series of holders, each of which
is movable from a normal position to an abnormal position to permit the removal of
its contents, and means for automatically
50 locking any one of said holders in its abnormal position upon the removal of its contents, combined with means carried by the holders whereby the moved holder is automatically unlocked upon the restoration of
55 its contents.

WILLIAM H. WOERHEIDE.

In the presence of—

E. K. CLARK,

E. B. LINN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TOP SUPPORT FOR TALKING MACHINE
AND OTHER CABINETS,
#1,188,895-----Frank L. Capps,
Patented-June 27th, 1916.
Filed-March 31st, 1913.

F. L. CAPPS.
 TOP SUPPORT FOR TALKING MACHINE AND OTHER CABINETS.
 APPLICATION FILED MAR. 31, 1913.

1,188,895.

Patented June 27, 1916.

Fig. 2.

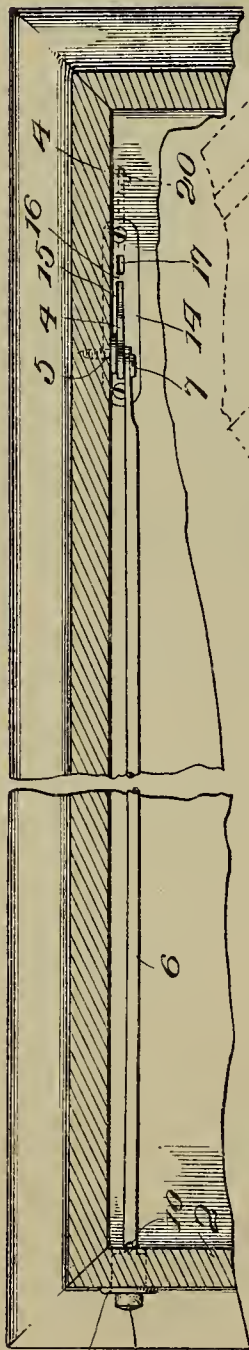
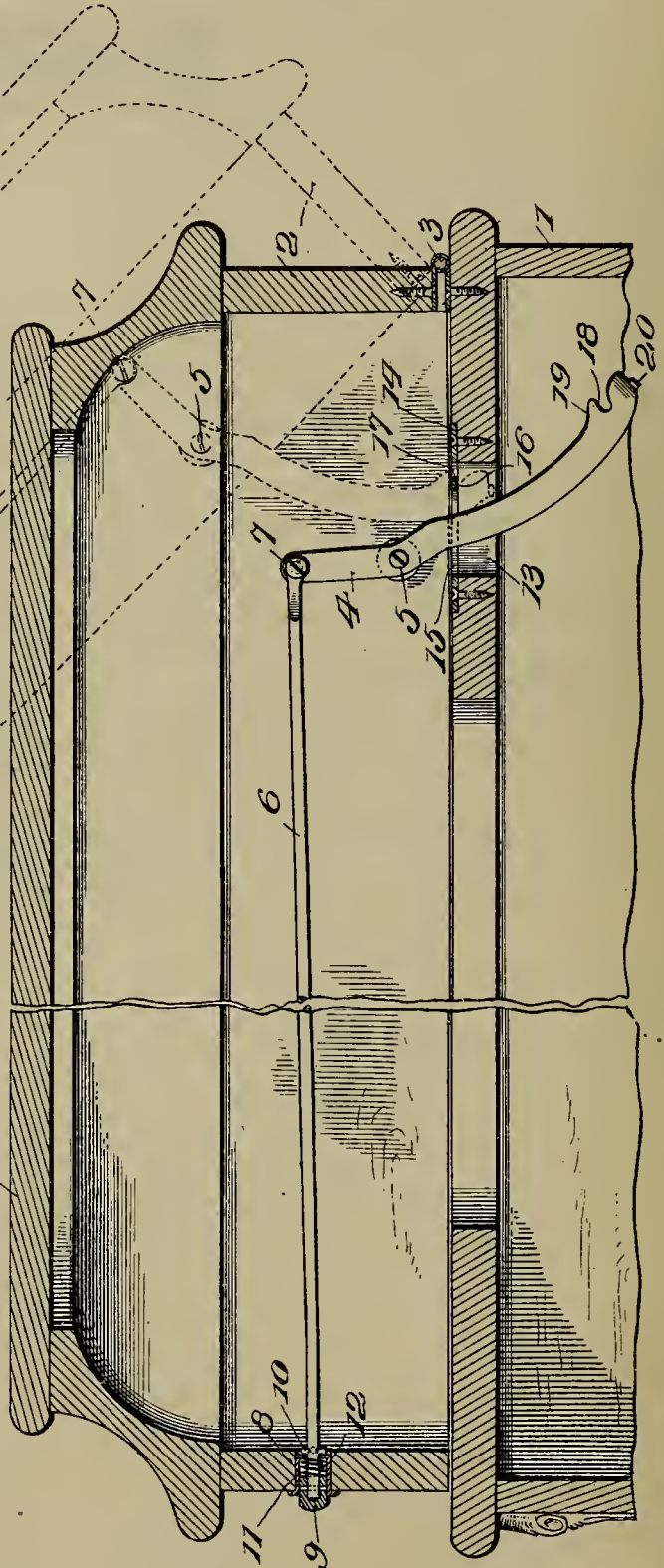


Fig. 1.



Witnessed
 Ruth C. Fitzhugh
 E. E. Warfield

INVENTOR.
 Frank L. Capps.
 By
 Mauro, Cameron, Lewis & Massie
 Attorneys

UNITED STATES PATENT OFFICE.

FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, A CORPORATION OF WEST VIRGINIA.

TOP-SUPPORT FOR TALKING-MACHINE AND OTHER CABINETS.

1,188,895.

Specification of Letters Patent.

Patented June 27, 1916.

Application filed March 31, 1913. Serial No. 757,864.

To all whom it may concern:

Be it known that I, FRANK L. CAPPS, a citizen of the United States, of Bridgeport, Connecticut, have invented a new and useful Improvement in Top-Supports for Talking-Machine and other Cabinets, which invention is fully set forth in the following specification.

This invention relates to improvements in top supports for talking machine and other cabinets.

Heretofore, cabinets of this character have been provided with means which act automatically, when the top is elevated, to retain the same in elevated position. The retaining device is generally located within the top (which is hinged to the cabinet), and in order to lower the top, such top has to be engaged by one hand of the operator, while the retaining device is tripped by the other hand.

The object of the present invention is to provide a retaining device of superior character, preferably located within the top, and means for tripping the retaining device, also preferably located within the top, but extending to a point exterior thereto and in convenient position to be actuated by the thumb or finger of the same hand of the operator that seizes the top for lowering the same.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings. Such drawings are not to be taken as defining the limits of the invention, reference being had to the claims for that purpose.

In said drawings, Figure 1 is a transverse vertical section through the top and upper portion of the body of the cabinet, showing my improved device in elevation, the full lines showing the position of the parts when the top is lowered, and the dotted lines the position of the parts when the top is elevated; Fig. 2 is a sectional plan view through the top of the cabinet above the retaining device; and Fig. 3 is a detail of the mounting for the push rod where it extends through the wall of the top.

Referring to the drawings, in which like reference characters indicate like parts, 1 is the upper portion of the body of any suit-

able cabinet, and 2 is the top or cover hinged thereto at 3. The top is preferably provided with a top wall which is preferably horizontal and flat and with side and end walls at angles to the horizontal. A supporting device for the cover is provided which is preferably a lever 4 pivoted to swing about an axis parallel to the hinge axis of the cover. An abutment is provided with which the lever can engage when in one position of adjustment about the axis, and by preference the abutment is on the body part of the cabinet, and the lever is on the top part. Means is provided for releasing the supporting device, this means being preferably a rod 6 pivotally connected to the lever 4 at 7, which rod extends along the interior of the top and outward through the front wall thereof at 8, where it is preferably provided with an enlarged end or button 9. The opening at 8 through which the rod extends is of greater diameter than the rod 6, and the button 9 is of slightly less diameter than said opening, in order that the button may snugly fit, but be free to play, therein. A suitable abutment, here shown as a pin 10, is formed on the rod 6, which abutment engages the interior face of a thimble 11 inserted in the opening 8, while a spring 12 surrounds the rod 6 and between the button 9 and the bottom of the thimble, which spring acts normally to force the rod and the button 9 outward until the pin 10 engages the thimble. Pressure on the button 9, however, will act to compress the spring, and through the rod 6, to rock the lever 4 on its fulcrum 5.

An opening 13 is formed through the upper wall or partition of the body of the cabinet, which opening is preferably surrounded by a countersunk metallic plate 14 having a slot 15 formed therein, through which the lower arm of the lever 4 depends when the top of the cabinet is in lowered position, as shown in full lines in Fig. 1. The rear wall of the slot serves as the aforesaid abutment to be engaged by the lower end portion of the lever 4, as hereinafter described, for the purpose of retaining the top in elevated position. Preferably this abutment is in the form of a bridge-piece 16 extending across the slot 15, so as to leave an opening or portion of the slot 17 to the rear thereof. The lower portion of the lever 4 is formed with

a shoulder or stop 18 for engaging the abutment 16, and on the same side as said shoulder and just above the same, with a cam-like surface 19, while the extreme lower end of the lever is provided with a laterally extending stop or lug 20, which acts to engage the under side of plate 14 to limit the opening movement of the top.

In the operation of the device, when the top is in the act of being elevated by the operator, the cam 19 engages the under side of the abutment 16, and rocks the lever 4 on its fulcrum, the spring 12 yielding to permit this rocking action, and as soon as the nose of the cam 19 passes the abutment, the spring reacts, moving the rod 6 to the left, and throwing the shoulder 18 over the abutment 16, the opening 17 permitting a more efficient formation of the shoulder for engagement with the abutment, and also permitting any dirt that might engage at that point to be shoved off, and dropped through the opening. The parts when elevated are then in the position shown in dotted lines in Fig. 1, the rod 6 and the button 9 being in the same position shown in full lines in Fig. 1. When the operator desires to lower the top, he slightly elevates the same by pressing the palm of his hand thereon, and pushes the button 9 inward with his thumb, thereby rocking the lever 4 so as to disengage the shoulder 18 from the abutment 16, and permit the lever 4 to descend through the slot 15, and the top to be again lowered into the position shown in full lines in Fig. 1.

It will be perceived that the automatic action of the device for retaining the top elevated is not dependent upon the action of gravity, as has been the case heretofore in devices of this character, but is assured by the action of the spring 12; that all the parts, except the button 9, are concealed within the top, so that they do not mar the external appearance of the cabinet, either when the top is lowered or elevated; and that the operation of lowering the top may be effected with great facility by one hand of the operator. Not only is the lowering action accomplished by one hand, but the necessity for reaching into a narrow space in the cabinet under the top for tripping the retaining device by hand is entirely eliminated.

Various changes may be made in the relative proportions and arrangement of the various parts, without departing from the spirit of the invention.

What is claimed is:—

1. In a cabinet, the combination of a cabinet body, a top hinged thereto at one edge, a lever pivoted to one of the said parts for movement about an axis parallel to the hinge axis, an abutment on the other of the said parts engageable by the lever when the latter is in one position of adjustment about

the axis to hold the top in elevated position and disengageable by the lever when the lever is in another position of adjustment, and means having a manually operable part carried by the top at a point remote from the hinge axis for swinging the lever about its pivotal axis to disengage the abutment, thereby leaving the top free to be lowered.

2. In a cabinet, the combination of a cabinet body, a top hinged thereto at one edge, a lever pivoted to the top for movement about an axis parallel to the hinge axis, an abutment on the body engageable by the lever when the latter is in one position of adjustment about the axis to hold the top in elevated position and disengageable by the lever when the lever is in another position of adjustment, and means having a manually operable part carried by the top at a point remote from the hinge axis for swinging the lever about its pivotal axis to disengage the abutment, thereby leaving the top free to be lowered.

3. In a cabinet, the combination of a cabinet body, a top hinged thereto at one edge and provided with side and end walls and a top wall, a lever pivoted to the top on the interior thereof, an abutment on the body engageable by the lever to hold the top elevated, and means having a manually operable part carried by the top at a point remote from the hinge axis for swinging the lever about its pivotal axis to disengage the abutment, thereby leaving the top free to be lowered.

4. In a cabinet, the combination of a cabinet body, a top hinged thereto at one edge and provided with side and end walls and a top wall, a lever pivoted to the top on the interior thereof, an abutment on the body engageable by the lever to hold the top elevated, a push button movably mounted in the wall of the top opposite to the hinge axis, and a push rod within the top between the push button and the lever for swinging the lever about its pivotal axis to disengage the abutment, thereby leaving the top free to be lowered.

5. In a cabinet, the combination of a cabinet body, a top hinged to the body at one edge and provided with side and end walls and a top wall, a device partly within the top supporting the top in a raised position, a push button movably mounted in the wall of the top opposite to the hinge axis, and a push rod within the top between the push button and the supporting device.

6. In a cabinet, the combination of a cabinet body, a partition across the top of the said body, a cover hinged to the body part above the partition and provided with side and end walls and a top wall, a cover supporting device connected to the cover and having engagement with the partition, and releasing means for the supporting de-

vice having a manually operable part carried by the cover and positioned at a point on the exterior thereof.

7. In a cabinet, the combination of a
5 cabinet body, a partition across the top of the said body, a cover hinged to the body part above the partition and provided with side and end walls and a top wall, a cover supporting device connected to the cover
10 and having engagement with the partition, and releasing means for the supporting device having a manually operable part carried by the cover at a point on the exterior and remote from the hinge axis.

15 8. In a cabinet, the combination of a cabinet body, a partition across the top of the said body having a slot therein, a cover hinged to the body part above the partition, a cover supporting device connected to the
20 cover and movable through the slot in the partition, a fixed abutment on the partition for the support of the cover by the said supporting device, and means for moving the said supporting device into and out of en-
25 gagement with the abutment.

9. In a cabinet, the combination of a cabinet body, a partition across the top of the said body having a slot therein, a cover

hinged to the body part above the partition, a spring-pressed lever pivoted to the cover 30 and extending through the slot in the partition, a lever engaging abutment on the partition adjacent the slot, and manually operable means carried by the cover for swinging the lever to disengage it from the 35 abutment.

10. In a cabinet, the combination of a body and a top hinged thereto, with a lever fulcrumed on the interior of the top and having a shoulder, an abutment on said 40 body to be engaged by said shoulder, a rod engaging said lever and extending out through the wall of the top, a spring acting on said rod to throw it outward, a stop limiting the outward movement of the rod, and 45 a cam on the lever engaging a part to rock the lever against the tension of the spring during the opening movement of the top.

In testimony whereof I have signed this specification in the presence of two subscrib- 50 ing witnesses.

FRANK L. CAPPS.

Witnesses:

M. E. LYLE,

J. S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents
Washington, D. C."

GRAPHOPHONE PATENT.

DIAPHRAGM.

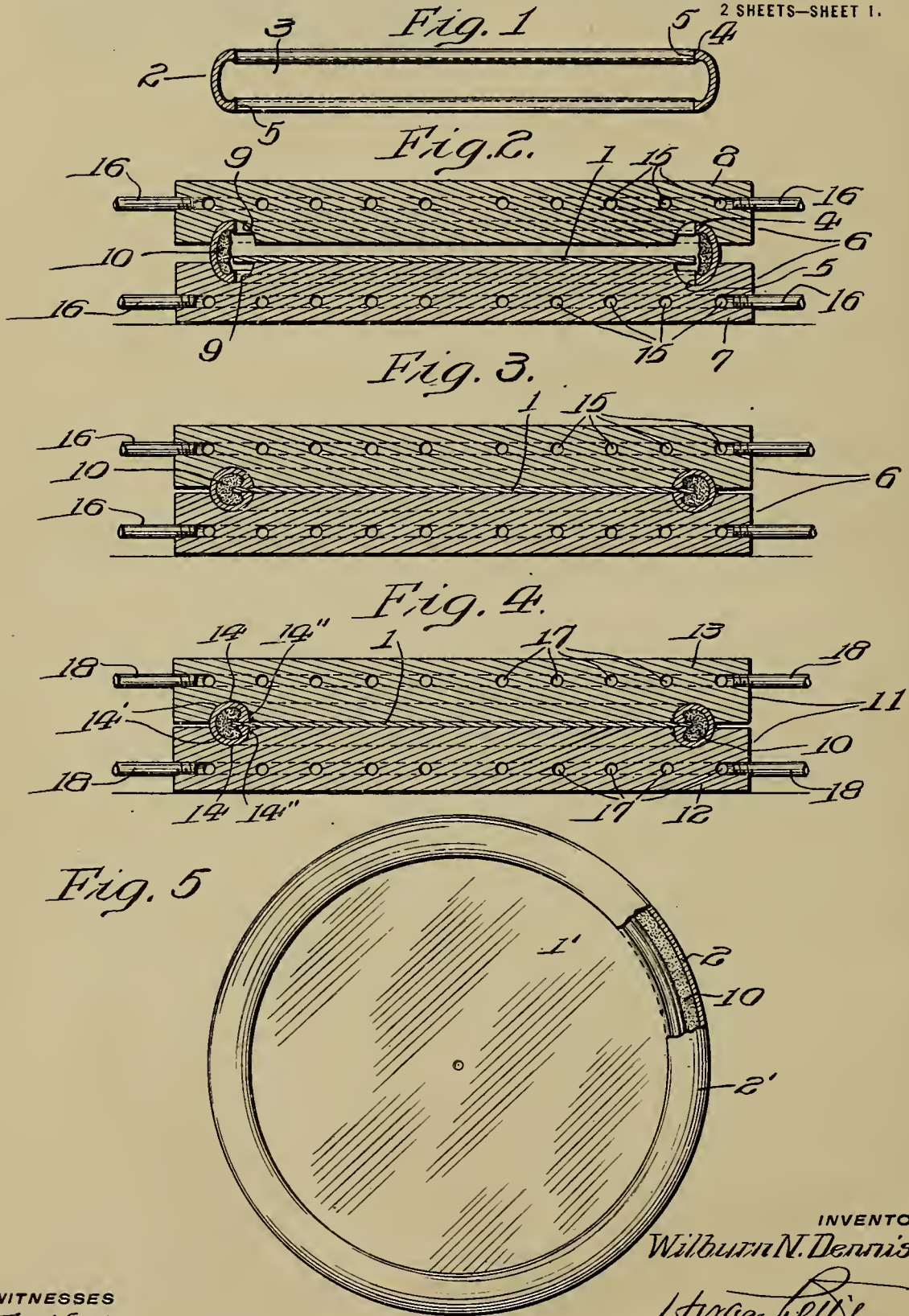
#1,188,909-----W. N. Dennison,
Patented-June 27th, 1916.
Filed-April 18th, 1912.

W. N. DENNISON.
DIAPHRAGM.
APPLICATION FILED APR. 18, 1912.

1,188,909.

Patented June 27, 1916.

2 SHEETS—SHEET 1.

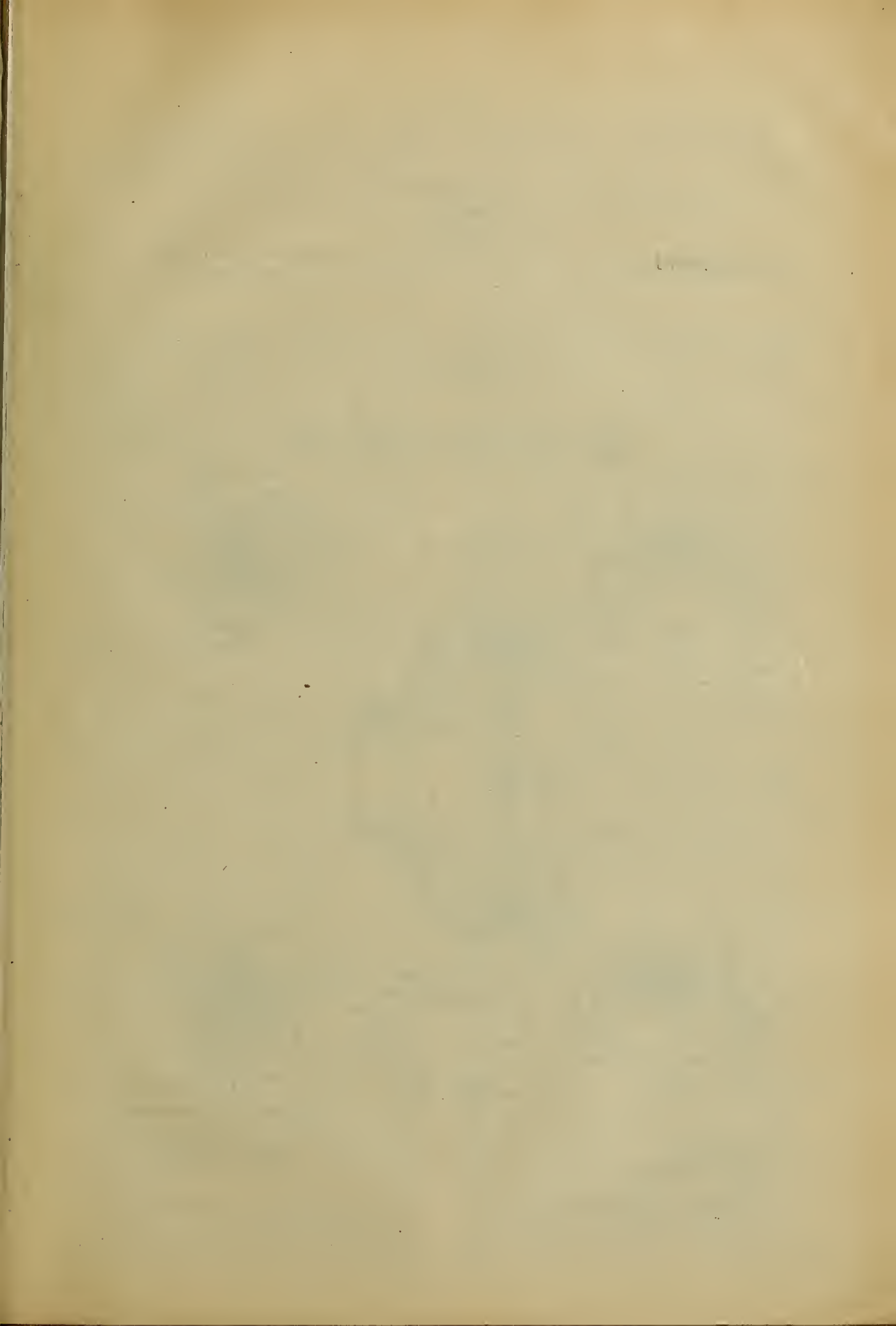


WITNESSES
F. G. Hartman.
Alex. B. Moulton

BY

INVENTOR
Wilburn N. Dennison
H. W. Bell

ATTORNEY



1,188,909.

Patented June 27, 1916.
2 SHEETS—SHEET 2.

Fig. 6.



Fig. 8.

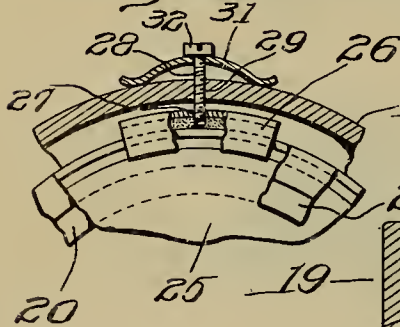


Fig. 7.

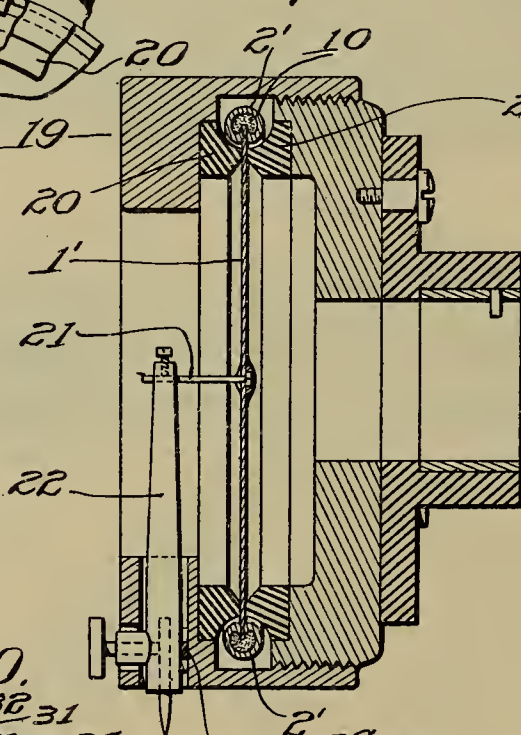


Fig. 9.

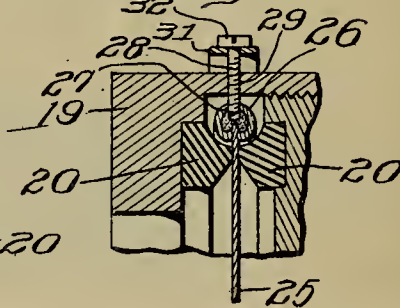


Fig. 10.

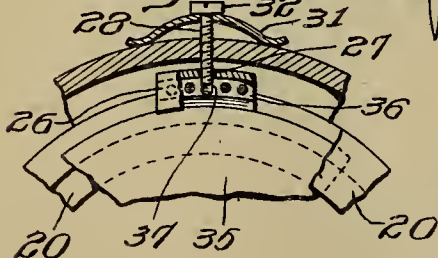


Fig. 12.

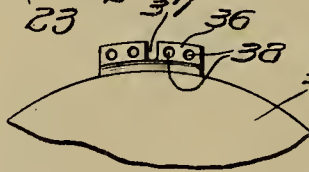
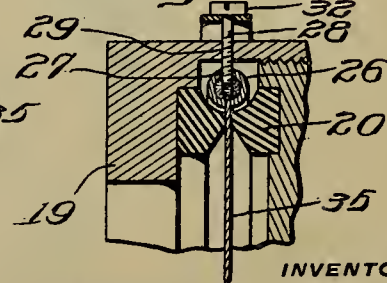


Fig. 11.



WITNESSES

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UNITED STATES PATENT OFFICE.

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DIAPHRAGM.

1,188,909.

Specification of Letters Patent.

Patented June 27, 1916.

Application filed April 18, 1912. Serial No. 691,570.

To all whom it may concern:

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of Merchantville, in the county of Camden, State of New Jersey, United States of America, have invented certain new and useful Improvements in Diaphragms, of which the following is a full, complete, and exact disclosure.

My invention relates to diaphragms such as are particularly used in sound recording and reproducing machines, such as talking machines, phonographs and the like.

The objects of my invention are, to produce a diaphragm which is more sensitive than those ordinarily found in sound recording and reproducing machines; to produce a purer and more perfect reproduction of sound than that ordinarily obtained; to obtain a reproduction of sound which is substantially identical with the original sound recorded in the sound record tablet; to enhance the detail, quality and volume of the sound reproduced from a sound record tablet; and to eliminate to a great extent the pronounced vibration or throbbing often occurring during the reproduction of sound from a sound record tablet.

Further objects of my invention are, to subject every point in the vibratory portion of a diaphragm to a strain or tension acting at that point in a direction radial to said diaphragm; to impose upon the flexible vibratory part or portion of a diaphragm substantially uniform and equal radial strains and tensions; to impose upon the vibratory part of a diaphragm an initial radial tension, and to retain said portion in that condition of tension; to provide a unitary diaphragm structure in which an initial radial tension to which the vibratory part as originally subjected is retained or continued or maintained by a substantially unyielding rigid ring or rim substantially unitary with said vibratory portion; and to apply to the vibratory portion of a diaphragm a rigid unyielding rim or edge; to impose upon said vibratory portion a substantially uniform radial tension; and to maintain the diaphragm by said rim in that condition.

Other objects of my invention appear in the specification and claims below.

Referring to the drawings forming a part of this specification, and in which the same

reference characters are employed to designate the same parts throughout the various views, Figures 1 to 4 indicate in a diagrammatic manner, and on a somewhat enlarged scale, the method of making a diaphragm embodying my invention; Fig. 5 is a plan view, partly in section, showing the completed diaphragm; Fig. 6 is a transverse central view of a modified form of diaphragm; Fig. 7 is a cross sectional view of a sound box in which my improved diaphragm is mounted; Figs. 8 and 9 are a fragmentary sectional view taken in a plane at right angles to the axis of the diaphragm and a fragmentary sectional view taken in a plane coincident with the axis of the diaphragm, respectively, of a modified form of this invention; Figs. 10 and 11 are a fragmentary sectional view taken in a plane at right angles to the axis of the diaphragm and a fragmentary sectional view taken in a plane coincident with the axis of the diaphragm, respectively, of a second modified form of this invention; and Fig. 12 is a fragmentary front elevation of the modified form of diaphragm shown in Figs. 10 and 11.

Referring first to the method or process of making my improved diaphragm as particularly illustrated in Figs. 1 to 4, I first form in any suitable manner a disk 1, of any suitable flexible elastic vibratable material. This disk may be of mica, metal, or any other material which may be vibrated either by or in accordance with impulses corresponding to sound waves. I also form a ring or rim or annulus 2, substantially C-shaped in cross section, said ring being substantially elliptical on the outer or peripheral edge of the same, and having the slot or opening 3 on the inner side thereof. The ends 4 of the said C-shaped section are preferably thickened to provide cylindrical surfaces 5—5 on the inner side thereof. I also provide a die 6, composed of two portions, which for convenience will be referred to as the lower portion or part 7 and the upper portion or part 8. These two portions or parts 7 and 8 are substantially identical with each other, each being provided with a substantially semi-circular groove in the adjacent faces thereof. I next place a suitable amount or layer of cementitious material, such as shellac, water-glass, or other cement, and place the said ring 2 in

said groove 9 of the lower part or portion 7 of the die 6; and I also place at the center of the said lower portion of the die the said disk 1, the periphery of said disk 1 overhanging the groove 9 equally on all sides, and extending substantially half way across said groove. I then place the upper portion or part 8 of the die in position with the upper part of the ring 2 seated in the groove 9 thereof, and force the two portions of the die toward each other under a high degree of pressure. Under this action the ring 2 will be bent and the ends 4 thereof will follow the interior of the grooves 9—9 and be bent downwardly and into a firm rigid clamping engagement with the periphery of the disk 1. The periphery of the disk 1 will be rigidly clamped between the surfaces 5—5 of the ring 2, and the thickened end 4 will provide an extended surface, which is in engagement with the said disk 1.

The pressure employed is such that the surfaces 5—5 of the ring will be forced into said disk 1 slightly below the planes of the faces of said disk 1. When mica is used, however, as the material of the disk 1, these surfaces 5—5 are pressed to a very slight distance below the planes of the faces of the disk adjacent thereto. Not enough pressure is used to fracture or break the mica. The said surfaces are pressed against the mica with only sufficient force to insure a rigid unyielding clamping of the periphery of the disk 1 between the said surfaces 5—5. During these steps of the process, the cementitious material 10 will substantially fill the interior of the ring 2, and will be entirely inclosed by the sides of the ring, and the periphery of the diaphragm clamped between the ends 4—4 of the ring. The next step is to impart to the vibratory disk 1 a radial stretch or tension. To do this I provide another die 11, composed of two portions, which for convenience I will term the lower part or portion 12 and the upper part or portion 13, each of said parts being provided with an annular groove 14. These grooves 14 are not exactly semi-circular in shape; the outer half 14' of each groove is of the same shape and size as the corresponding part of the semi-circular groove 9 in the parts 7 and 8 of the die 6, but the inner portion 14'' of each of said grooves 14 is of less radius than the radius of the portion 14' of said groove. It will thus be seen that while the outer diameter of the grooves 14 is the same as the outer diameter of the grooves 9, the inner diameter of said grooves 14 will be greater than the inner diameter of the grooves 9. In practice the inner diameter of the grooves 14 is about 1/100 of an inch greater than the inner diameter of the grooves 9.

After the ring 2 has been secured to the periphery of the disk 1 in the manner above

described, between the parts 7 and 8 of the die 6, the parts so assembled and united are removed from the die 6 and placed in the die 11, and a high pressure is applied to the same. As a result of this, the outer diameter of the ring or rim 2 is unchanged, but is held firmly within the grooves 14 of the die 11; but the inner diameter of the ring will be forced outwardly radially from the center of the die, due to the fact that the inner portion of the grooves 14 is of larger diameter than that of the groove 9 of the die 6. But the thickened ends 4 and the surfaces 5 of the ring will be firmly, rigidly and fixedly held with respect to the periphery of the disk 1. The vibratory portion of the disk 1 within the ring or rim 2 will therefore be subjected to a radial tension throughout; that is to say, every point of the disk 1 within the rim will be subjected to a tension or stretch or strain, the direction of which is radial to the said disk.

After the ring or rim 2 has been so stretched or expanded in the die 11, it is removed therefrom, and a diaphragm such as is shown in Fig. 5 will result. This diaphragm will consist of the vibratory portion 1', every point in which is under a radial tension, said vibratory portion being maintained in that stretched or tensioned condition by the rigid unitary, preferably metallic, rim 2'.

In Fig. 6 is shown a diaphragm made by the same steps as those above described in connection with the production of the diaphragm shown in Fig. 5, except that the cementitious material 10 is omitted.

In practice I find that the best results are obtained when the dies 6 and 11 are kept cold, and I have therefore diagrammatically indicated the parts 7 and 8 of the die 6 as provided with passages 15 communicating with pipes 16, to permit of the circulation through the die of a suitable cooling fluid, such as a brine or any other cooling agent.

The die 11 is also preferably cooled and the parts 12 and 13 are similarly shown as provided with passages 17 communicating with pipes 18, for the circulation of a cooling fluid. I have found that when the dies 6 and 11 are cooled by the circulation of a freezing mixture throughout, good results are obtained.

It will be seen that the diaphragms produced as above described and as illustrated in Figs. 4, 5 and 6, are unitary structures. The rim 2' is rigidly, permanently and immovably secured and attached to the periphery of the vibratory portion 1' thereof, and the rim 2' is of such a material as will maintain the shape into which it is so pressed or stretched by the die 11 and will hold the vibratory portion 1' in a radially stretched condition.

In Fig. 7, I have indicated one way in

which the said diaphragm may be mounted within a sound box 19 of a sound reproducing machine between yielding rings or gaskets 20—20, engaging the opposite faces of said vibratory portion 1' within the rim 2' and out of engagement with said rim 2'. The rings or gaskets 20 are preferably soft and engage the diaphragm with sufficient force to hold it in position in the sound box with the rim 2' out of engagement with the sound box and the gaskets 20. The sound box 19 may be of the usual and well known construction, and the center of the diaphragm is connected in any usual manner, as by the connecting rod or bar 21 with the inner end of the stylus bar 22 pivoted at 23 to the sound box 19.

A diaphragm made in the manner above set forth gives a remarkably pure tone of reproduction of great volume and excellent quality, and the reproduced sound is exceedingly pleasant and free from those objectionable rhythms or throbs or vibrations of great amplitude frequently occurring during the reproduction of sound from a sound record tablet.

Although this invention is not to be construed as being limited to the employment of a cooling fluid of any predetermined temperature, or to the use of the diaphragm so formed for the reproduction of sound at any predetermined temperature, it has been found that when the diaphragm is made between the parts or portions of dies such as are above described, in which is circulated a cooling fluid medium of about 32° F., and the diaphragm so formed is used in the reproduction of sound from a sound record tablet at a temperature of around 60° F., and even up to normal atmospheric temperatures, a remarkably fine quality of reproduction of sound is obtained. It has been suggested that these results are probably due to the differences in the expansion of the materials employed, and perhaps also to the cross sectional shape of the ring; that the expansion of the ring causes the ring to grip the periphery of the disk even more firmly than it did at the lower temperature; and that the radial expansion of the metallic ring being greater than that of the mica disk causes the ring to increase the radial tension on the disk at the higher temperatures. The full extent to which these factors may vary and improve the quality of the reproduced sound, I am unable at the present time to definitely state. My invention, however, contemplates a diaphragm structure in which the vibratory portion and the rigid rim expand at different rates under a rise of temperature, and therefore the action of the rim will be to maintain the vibratory portion under tension at any temperature above that at which the two said portions of the diaphragm are united.

This invention may also be embodied in various other forms than the one hereinbefore described. For instance, as illustrated in Figs. 8 and 9, the circular diaphragm 25, instead of being tensioned by a continuous marginal annular ring or rim 2', as hereinbefore described, is tensioned by means of a plurality, preferably three or more, of ring or rim sections or segments 26 spaced equally around and securely clamped to the marginal portion of the diaphragm 25. These ring sections 26 are preferably clamped in place by means of a die or dies, as hereinbefore described, the ring sections being preferably filled with cementitious material, as in the case of the ring or rim 2' hereinbefore described. The ring sections are preferably the same in cross section as the rim 2' hereinbefore described. The outer central portion of each segment 26 is provided with a radially extending threaded aperture 27 in which is threaded an adjustable tensioning screw 28 which extends outwardly loosely through an aperture 29 provided therefor in the sound box casing 19 and loosely through a spring or other yielding member 31, which engages against the outer surface of the sound box casing. The screw 28 is provided with a slotted head 32 which engages against the outer surface of the yielding member 31 and the yielding member 31 normally tends to press the screw 28 outwardly through the casing 30, thus in coöperation with the other similar screws and yielding members, producing an outward tension on the diaphragm 25, which is thus held in a state of radial stretch or tension, the screws being adjustable to vary the stretch or tension. The diaphragm 25, in this instance, is supported as hereinbefore described, between two yielding gaskets 20.

This invention may be further modified by providing a diaphragm 35 having a circular body portion and a plurality, preferably three or more, of tabs 36 projecting radially therefrom and integral therewith. These tabs 36 are preferably spaced equally around the marginal portion of the body of the diaphragm and are securely clamped, as hereinbefore described, between ring or rim sections 26, inclosing cementitious material, the diaphragm being tensioned, as hereinbefore described, by screws 28 and yielding members 29. Each tab 36 is preferably provided with a central radial slot 37 to permit of the free movement of the corresponding screw 29. Each tab is also preferably provided with a plurality of apertures 38 in which the cementitious material engages to anchor the tab to its segment. The diaphragm in this latter instance is also preferably mounted between two yielding gaskets 20, as hereinbefore described.

This invention is not limited to any specific method or to any specific construction, 130

as various changes might be made both in the method and construction, without departing from the spirit of the invention or the scope of the appended claims. Thus
 5 the size or diameter of the grooves 14 in the die 11 may be slightly larger than that of the grooves 9 in the die 6, but of the same size and shape in cross section, in which event the ring 2 would be stretched or ex-
 10 panded throughout when pressed in the die 11 as distinguished from being stretched or expanded on the inner side thereof merely as previously described, and the stretching or expanding of the entire ring 2 would, in
 15 the same manner place the vibratory portion of the diaphragm under a radial stretch or tension.

Among other things it has been found that diaphragms placed under radial tension as
 20 above described return to their normal or neutral positions very much more quickly than do diaphragms not under such tension, and that they are more sensitive and more perfectly expansive to impulses, correspond-
 25 ing to sound waves, impressed upon the same, than are diaphragms which are not subjected to radial tension.

Having thus described my invention, what I claim and desire to protect by Letters Pat-
 30 ent of the United States is:

1. A unitary diaphragm comprising a vibratory portion and a rim engaging opposite sides of said diaphragm and fixedly secured to the periphery of said vibratory
 35 portion, every point in said vibratory portion having a radial tension imposed thereon by said rim alone.

2. A unitary diaphragm comprising a vibratory portion and an integral ring fixedly
 40 secured to the periphery of said vibratory portion and symmetrically disposed on opposite sides of the plane of said diaphragm, every point in said vibratory portion having a radial tension imposed thereon by said
 45 rim alone.

3. A diaphragm comprising a vibratory radially stretched portion and a slotted ring, the periphery of said vibratory portion being rigidly clamped in the slot of said ring
 50 and placed and held by said ring under radial tension.

4. A unitary diaphragm comprising a vibratory portion and an integral rim engaging opposite sides of and fixedly secured to the periphery of said vibratory portion,
 55 every point in said vibratory portion having a radial tension imposed thereon by said rim alone.

5. A diaphragm comprising a vibratory portion and a slotted metallic ring, the periphery of said vibratory portion being rigidly clamped in the slot in said ring and placed and held by said ring alone under radial tension.

6. A diaphragm comprising a vibratory
 65 disk and a slotted ring, the periphery of said disk being clamped by said ring in said slot, the edges of said slot being forced into and below the planes of the adjacent surfaces of said disk and holding said vibra-
 70 tory disk under radial tension.

7. A diaphragm comprising a vibratory disk and a rigid ring provided with a circumferential slot on the inner side thereof, the edges of said slot holding the periphery
 75 of said disk rigidly clamped between the same and holding said vibratory portion under radial tension.

8. A diaphragm comprising a vibratory portion and a metallic ring, the periphery of
 80 said vibratory portion being clamped by said ring, said vibratory portion being placed by said ring under radial tension.

9. A diaphragm comprising a vibratory disk and a slotted ring, the periphery of the
 85 disk being clamped by the ring in said slot, the interior of said ring being filled with a cement, said vibratory disk having a radial tension imparted thereto by said ring alone.

10. A diaphragm comprising a radially
 90 stressed portion, a ring uniformly disposed about the edge thereof which edge is clamped by said ring whereby said diaphragm is placed and held by said ring under equal tension on the respective sides
 95 thereof.

In witness whereof, I have hereunto set my hand this 16th day of April, A. D. 1912.

WILBURN N. DENNISON.

Witnesses:

FRANK B. MIDDLETON, Jr.,
 HARRY COBB KENNEDY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

1139063

PHONOGRAPH STOP,
#1,189,063-----V. Constantine,
Patented-June 27th, 1916.
Filed-November 21st, 1914.

V. CONSTANTINE.
 PHONOGRAPH STOP.
 APPLICATION FILED NOV. 21, 1914.

1,189,063.

Patented June 27, 1916.

Fig. 1.

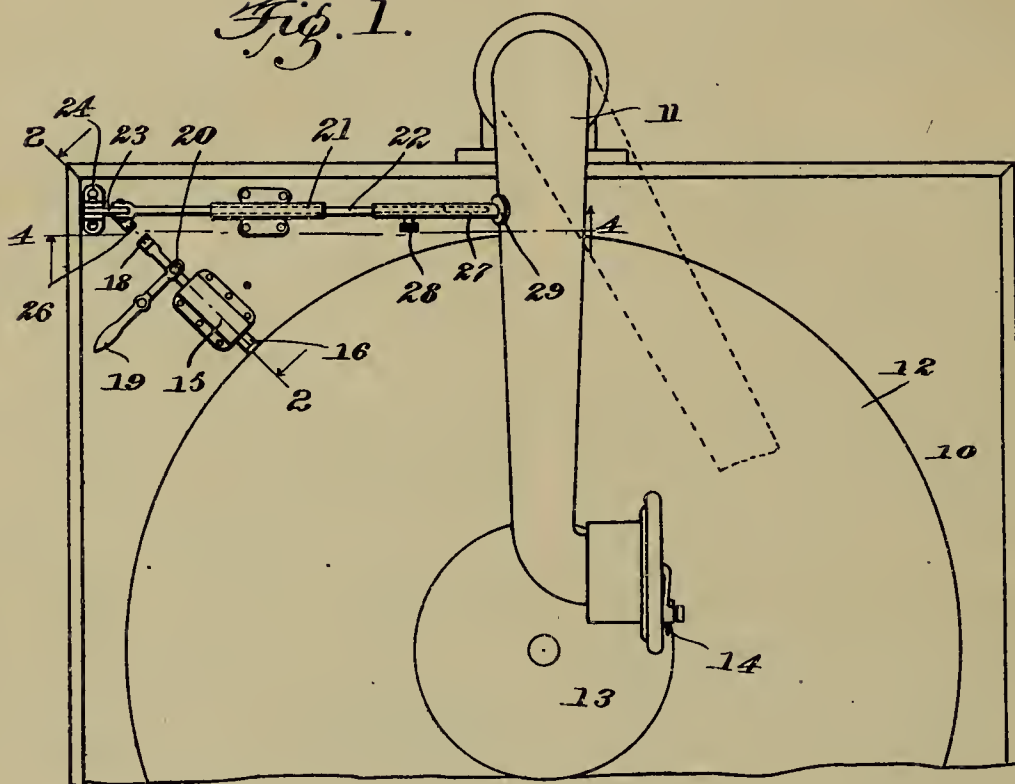


Fig. 2.

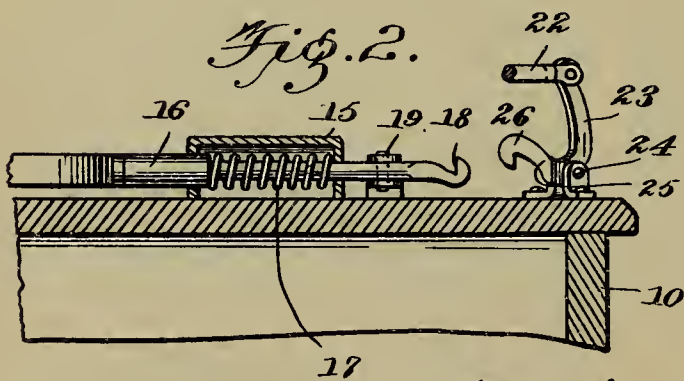


Fig. 3.

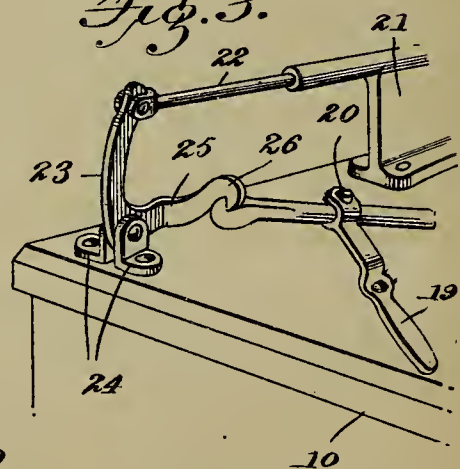
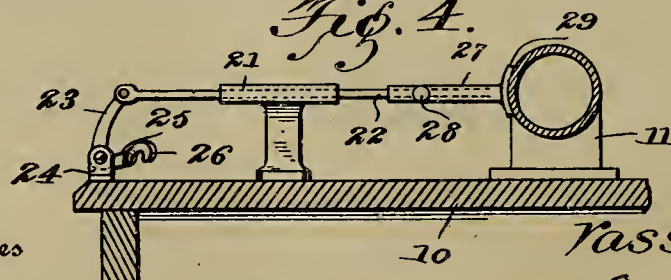


Fig. 4.



Inventor

Russil Constantine

By Victor J. Evans

Attorney

Witnesses

W. S. McLowell
 A. H. Hester

UNITED STATES PATENT OFFICE.

VASSIL CONSTANTINE, OF PHILADELPHIA, PENNSYLVANIA.

PHONOGRAPH-STOP.

1,189,063.

Specification of Letters Patent. Patented June 27, 1916.

Application filed November 21, 1914. Serial No. 873,372.

To all whom it may concern:

Be it known that I, VASSIL CONSTANTINE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Phonograph-Stops, of which the following is a specification.

The invention relates to phonographs, and has for an object to provide an automatic stop therefor.

The invention contemplates, among other features, the provision of a simple device that can be readily applied to the various types of talking machines or phonographs now generally used, particularly those which contemplate the use of a disk record, the device being readily adjusted so that when a selection is played upon the record and the end of the selection is reached the rotation of the table will be automatically stopped.

In the further disclosure of the invention reference is to be had to the accompanying drawings, constituting a part of this specification, in which similar characters of reference denote corresponding parts in all the views, and in which:

Figure 1 is a fragmentary plan view of a phonograph showing my device applied thereto, the full lines showing the tone arm in its final position and the dotted lines in playing position; Fig. 2 is an enlarged vertical sectional view taken on the line 2—2 in Fig. 1; Fig. 3 is a fragmentary perspective view of a detail portion of the device; and Fig. 4 is a vertical sectional view taken on the line 4—4 of Fig. 1.

Referring more particularly to the views, I disclose a phonograph or talking machine 10 having the usual tone arm 11 mounted to swing horizontally thereon and operate upon a record 12 carried by a table 13, revolvable by suitable mechanism forming a part of the talking machine and whereby rotation is imparted to the record so that a stylus 14 on the tone arm operating from the outer edge of the record toward the inner edge thereof will travel in the grooves of the record to produce the sounds in the usual manner.

A casing 15 supported on the top of the talking machine 10 and arranged to slide through the said casing has a stop member 16 adapted to have its inner end engage the table 13, said stop member being actuated by

a spring 17 contained in the casing 15 and having its other end terminating in a suitable hook 18, an operating lever 19 being pivoted upon the top of the talking machine 10 through the medium of a pin and slot connection 20 having connection with the stop member 16 as shown.

A sleeve 21 is supported on the top of the talking machine and mounted to slide therein is a rod 22 having its inner end pivoted to a bell crank lever 23 mounted to swing upon suitable bearings 24 and having an arm 25 thereof terminating in a hook 26 for engagement with the hook 18 on the stop member 16, as shown in Fig. 3.

The free end of the rod 22 carries an adjustable tubular member 27 which is arranged to slide upon the rod and can be secured rigidly thereon by a suitable set screw 28, said adjustable tubular member 27 having its free end provided with a suitable head 29, the face of which is curved to conform to the curvature of the tone arm 11.

In the operation of the device, we will assume that the stop member 16 engages the periphery of the table, due to the action of the spring 17, the hook 19 at this time being out of engagement with the hook 26. The desired record having been placed upon the table the tone arm is now swung inwardly until the stylus 14 lies in the innermost groove of the record and when in this position the tubular member 27 is advanced or retreated upon the rod until the head 29 of the member 27 abuts against the face of the tone arm. The member 27 is now secured rigidly upon the rod 22 by the set screw 28 and the tone arm is now swung outwardly until the stylus 14 operates in the first or initial groove of the record. Now by operating the lever 19 the stop member 16 will be moved out of engagement with the periphery of the table and in so doing the hook 19 will be engaged with the hook 26, it being readily seen by referring to the views that the arm 25 of the bell crank lever 23 extends at an angle to the other arm of the bell crank lever so that the action of the spring 17 will not tend to exert a pull upon the rod 22. The table being now in operation, the tone arm 11 will swing inwardly as the stylus 14 advances in the grooves of the record and when the stylus reaches the inner groove, it will be clearly seen that the tone arm will engage the head 29 of the member 27, thus exerting a push upon the rod 22 and

causing the bell crank lever 23 to be swung so that the arm 25 will rise and result in the disengagement of the hook 26 with the hook 19, thus releasing the stop member 16 so that it will be subjected to the action of the spring 17 and cause its free end to be moved into and engage the periphery of the table to act as a brake upon the table and stop its rotation.

From the foregoing description it will be clearly seen that the device described is of a simple construction, consists of few parts which can be cheaply manufactured and that the device can be readily applied to various makes of talking machines or phonographs using disk records.

Having thus described my invention, I claim:

In a phonograph stop, a vertically dis-

posed bell crank lever pivoted to swing upon the phonograph, a hook formed on one arm of the bell crank lever at right angles thereto, a bearing spaced from the bell crank lever and having a guide sleeve, an adjustable rod pivotally connected to the other arm of the bell crank lever and slidable through the sleeve and adapted to be moved by the reproducer arm of the phonograph, and a brake adapted for engagement with the turn table of the phonograph and having a hooked end for engagement with the hook on the bell crank lever.

In testimony whereof I affix my signature in presence of two witnesses.

VASSIL CONSTANTINE.

Witnesses:

HELEN G. DALEY,
NORMAN J. SMITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

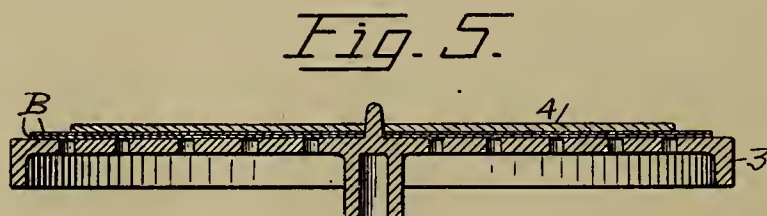
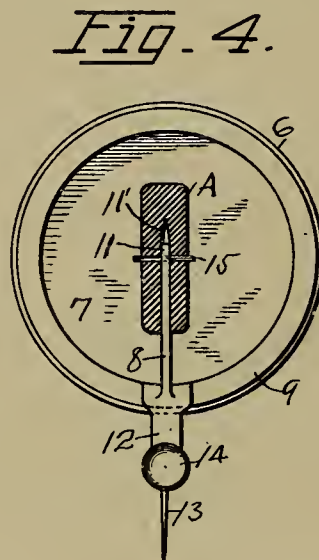
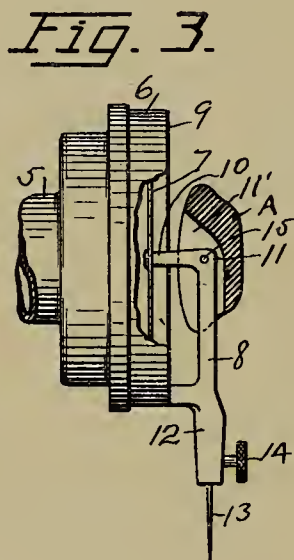
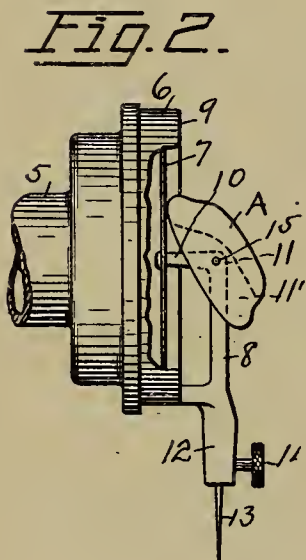
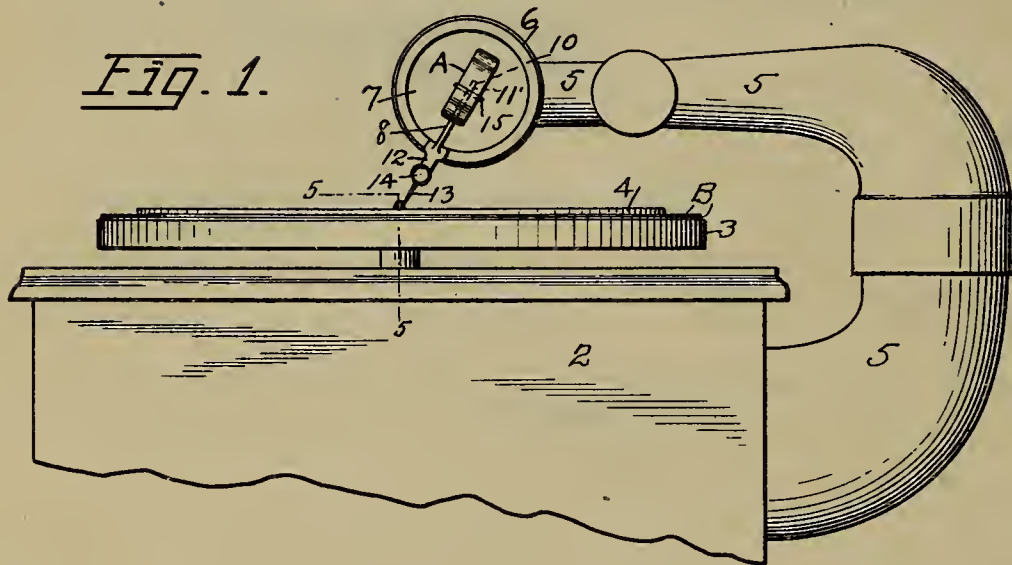
TONE PURIFIER.

#1,189,152-----C. P. Marshall.
Patented-June 27th, 1916.
Filed-April 20th, 1915.

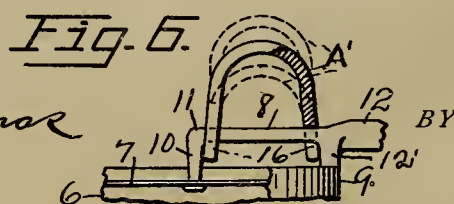
C. P. MARSHALL.
TONE PURIFIER.
APPLICATION FILED APR. 20, 1915.

1,189,152.

Patented June 27, 1916.



WITNESS
A. C. Thomas



INVENTOR.
Charles P. Marshall
BY *Harry D. Wallace*
ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES P. MARSHALL, OF WATERTOWN, NEW YORK.

— TONE-PURIFIER. —

1,189,152.

Specification of Letters Patent. Patented June 27, 1916.

Application filed April 20, 1915. Serial No. 22,709.

To all whom it may concern:

Be it known that I, CHARLES P. MARSHALL, a citizen of the United States, residing at Watertown, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Tone-Purifiers, of which the following is a specification.

This invention relates to tone purifiers, designed for use in connection with talking machines generally, and the invention relates particularly to a device of the class for attachment to the reproducers of victrolas, graphophones, phonographs and like talking machine, wherein the well known vibration-bars or members are employed for conducting the sound vibrations from the needle to the reproducing diaphragms.

The object of the present invention is to provide novel and simple means for improving—rendering clear, pure and natural—the sounds of voices, music, and the like, reproduced by talking machines, by eliminating practically all buzzing, yawling and reediness, which are caused chiefly by an excess of the high harmonic waves mingling with the predominant notes (original sound waves) and their proper harmonics as incorporated in the records.

A further object is to provide a tone purifier consisting of an elastic or semi-elastic substance, which is preferably applied to the usual vibration-bar which conducts the sound vibrations from the needle to the reproducing diaphragm. The nature and location of the said purifier being such that it absorbs or reduces the excess of the high harmonic waves or overtones produced by the vibration-bar, so that only the pure and clear and audible sound of the predominant note as recorded is heard.

A further object is to provide a tone purifier consisting of a body of rubber or similar substance, but preferably a non-conductor of sounds, which is pivotally mounted on the vibration-bar of the reproducer, and which is adjustable for bringing the said body into contact with the reproducing diaphragm for bridging the said parts, thereby diminishing to a great extent the raw rasping noises caused by the fundamental note of the said diaphragm, which it has been found also contributes to the excess of the high harmonics. And a further object is to provide means interposed between the record and the revolving disk which supports the

record, for reducing the high harmonics of the fundamental note of the said disk, which further contributes to the disagreeable foreign noise emitted during the reproduction of the record.

I attain these objects by the means set forth in the detailed description which follows, and as illustrated by the accompanying drawing, in which—

Figure 1 is an elevation view of the reproducing part of a talking machine; showing my tone-purifier applied thereto. Fig. 2 is an enlarged side elevation of the transmitter showing one member of my tone purifier pivotally applied to the vibration-bar; the said member also engaging the diaphragm. Fig. 3 is a similar view; showing the said member disengaged from the diaphragm. Fig. 4 is a front face view of the transmitter. Fig. 5 is a central vertical section, taken on line 5—5 of Fig. 1; showing the second member or part of the tone purifier interposed between the record and the revolving disk. Fig. 6 is a view; showing a modification of the purifier member applied to the vibration-bar.

In the drawing, 2 represents the cabinet of the talking machine, and 3 the revolving disk which supports the record 4. 5 represents the usual tapering tone-arm, upon the free end of which is mounted the transmitter 6, and 7 represents the reproducing diaphragm of the transmitter. All of the foregoing parts may be constructed in the usual manner and of any suitable material.

8 represents one form of the usual vibration-bar which is mounted upon the collar or rim 9 of the transmitter. One end 10 of the vibration-bar is bent at right angles to the body and connects in the usual manner to the center of the diaphragm, 7, the bend of the said bar will be designated, the elbow, 11. The opposite end of the vibration-bar 8 has a socket 12 into which the reproducing needle 13 is inserted, and the latter is held in place by a set-screw 14.

Fig. 1 shows the needle 13 in engagement with the record, in the act of reproducing sounds recorded thereon. As the record is rotated, the needle 13 follows the record groove and is vibrated in the usual manner. The vibrations of the needle are communicated to the bar 8, and the bar in turn vibrates the diaphragm 7, and the latter converts the vibrations it receives from the needle 13 and the bar 8 into audible sounds,

which are carried through the tapering tone-arm 5 and the cabinet 2, where they are suitably amplified.

My tone purifier is in two parts, as A and B. The part A consists, in the preferred form, of a block of soft rubber, having the consistency of the common Faber rubber eraser, which is more or less pliable, spongy and adhesive. The said body may be of any suitable size or shape, but is preferably made in the form shown in the drawing. The part A is preferably mounted upon the vibration-bar 8, and for this purpose the underside of said part has a kerf 11', which receives the elbow 11 of the said bar, and the said part is preferably pivoted to the bar 8 by means of a pin 15, which allows the said part to be tilted toward and away from the diaphragm, as best seen by comparing Figs. 2 and 3. The pivot 15 is employed chiefly to prevent the accidental detachment of the member A. The kerf 11' of the part A is preferably narrower than the bar 8, so that a little pressure is required for forcing the said part into position, and the rubber being relatively soft yields readily to the pressure, and being naturally adhesive clings closely enough to the bar to remain in either of the adjusted positions. By thus disposing the rubber part A, each predominant note throughout a reproduction, is relieved of practically all harshness or rawness due to the excess of the high harmonics produced by the lateral vibrations of the bar 8. But the said part, notwithstanding its felty and gummy nature, still allows the said bar to vibrate under the influence of the needle 13 to the right extent for aiding the diaphragm 7 in the reproduction of the true musical tone or note originally recorded. The elbow 11 of the bar 8, as explained, produces longer wave lengths than the other portions of the said bar, and these longer lateral waves yield more and stronger harmonics—both upper and lower harmonics. By the disposition of the filter A substantially as shown in Fig. 3, it serves to reduce to a greater extent the long lateral vibrations of the bar 8. This diminishes the excess of the overtone of the fundamental note of the said bar, and reduces to a marked degree the harsh and grating sounds of the reproduction.

To still further reduce or modify the high harmonics and therefore to clear up the predominant notes of the record during the reproduction, the purifier part A may be tilted on the pivot 15 (see Fig. 2) so as to bring its forward or free end into engagement with the outer face of the diaphragm 7, preferably some little distance beyond the center of the diaphragm. When the rubber part A is thus brought into contact with the diaphragm 7, the excess of the high harmonics of the diaphragm is instantly eliminated,

and the diaphragm will then articulate its fundamental note naturally and distinctly. By disposing the purifier A as shown in Fig. 2, it subdues the overtones of both the vibration-bar 8 and the diaphragm 7. This tends to increase the harmony and smoothness of the general tone of the instrument, and the subsequent rendition of the record is purer, clearer and more lifelike.

There is still another part of the reproducing mechanism to be considered: The revolving disk which supports the record, owing to its structure and its intimate association with the record disk, as well as the adjacent sound-conducting and amplifying parts of the talking machine, also vibrates in unison with the other parts of the instrument, and accordingly the said disk has a fundamental note of its own, which is usually accompanied by an excess of the high harmonics, the same as the vibration-bar and the diaphragm. In order to complete the purifying process, the said part B of the harmonic purifier is provided. The part B consists of one or more thin and pliable sheets or disks of rubber or similar material, which are mounted loosely upon the top surface of the revolving disk 3, and upon which rests the record, as 4. The disks B, are preferably slightly larger in diameter than the record, and being soft afford a light cushion for the record, and as the rubber disks are relatively smooth and adhesive, the underside of the record closely engages and clings to the adjacent rubber disk. The rubber sheets B are non-conductors of sounds, and therefore they insulate the records from the revolving disks, to the end that, the excess of the high harmonics or overtone which accompanies the fundamental note of the revolving disk, is reduced or modified to such extent that the harsh, buzzing noise, contributed by the revolving disk, and which in the past mingled with the sound waves of the predominant note of the record, is thereby eliminated. The rubber sheets B also serve to reduce the excess of the high harmonics of the record-disk, as well as the revolving part which supports the said record.

Fig. 6 illustrates a modification of the member which is applied to the vibrator-bar, which consists of a flexible strip of rubber A', of about the same consistency of the member A, each end of the member A' is slotted, as best seen at 16. To apply the part A', it is first bent in the form of a horseshoe, and the opposite ends are then placed in engagement with the top of the bar 8, with the slots 16 directly over the said bar, after which the member is forced downwardly until the bar enters the said slots. The rubber strip A' is preferably stiff and springy enough so that its ends expand until they respectively bear or press

against the portions 10 and 12' of the bar. The said member will then remain in the position as shown. The members A' may be made to different lengths as shown by the full and dotted lines in Fig. 6.

The two parts A and B of my harmonic purifier may be varied in size, shape and consistency, and they may be applied to the reproducing parts in any suitable manner. But in order to produce the best results, they must both be employed at the same time. If either of said parts is omitted during the reproduction of a record, the rendering of the record will be more or less faulty and unnatural, as described.

It is obvious that some changes or modifications may be made in the parts of the device, within the scope defined by the appended claims, without departing from the spirit of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patents, is—

1. The combination of a talking machine, having a sound reproducing mechanism including a vibration-bar and a diaphragm, and a tone purifier, said purifier comprising an adhesive elastic part mounted upon the said vibration bar and movable into and out of engagement with the diaphragm for reducing the lateral vibrations of the said bar, substantially as described.

2. The combination of a talking machine having a vibration-bar and a reproducing diaphragm, and a tone purifier comprising an elastic part mounted upon the said bar and capable of a movement into and out of engagement with the diaphragm for subduing the high harmonics of the said bar, substantially as described.

3. The combination with a talking machine having a vibration bar and a reproducing diaphragm, of a tone purifier adapted for attachment to the vibration bar, the said tone purifier having a kerf therein to receive the vibration bar and movable into and out of engagement with the diaphragm.

4. The combination with a sound reproducer, including a diaphragm and vibration bar, which actuates said diaphragm, a tone purifier mounted on said vibration bar, the said tone purifier being capable of a movement whereby the same is brought into engagement with the diaphragm for subduing the excess of the high harmonics of the diaphragm and the bar.

5. The combination with a sound pro-

ducer including a diaphragm and a vibration bar, of an elastic purifier mounted on said bar, said purifier having a kerf therein to receive a portion of the bar and adapted to adhere and cling to said bar for reducing the lateral vibrations thereof, the said purifier being capable of a movement into and out of engagement with the diaphragm.

6. A tone purifier for talking machines comprising a resilient body pivotally mounted upon the vibration bar which vibrates the reproducing diaphragm, the said body being capable of a movement into and out of engagement with the diaphragm, for the purposes set forth.

7. A sound purifier for talking machines, comprising a non-conductor of sound mounted upon the vibration bar which actuates the diaphragm, the said non-conductor of sound overlying the side of the diaphragm and arranged within the borders thereof whereby it may be brought into and out of engagement with the diaphragm.

8. A tone purifier for talking machines, comprising a body carried by the vibration bar that vibrates the reproducing diaphragm, the said body being capable of a movement into and out of operative association with the diaphragm, substantially as described.

9. A tone purifier for talking machines comprising a non-conductor of sound operatively associated with the vibration bar that vibrates the reproducing diaphragm, the said non-conductor being capable of a movement into and out of operative relation with the diaphragm, substantially as described.

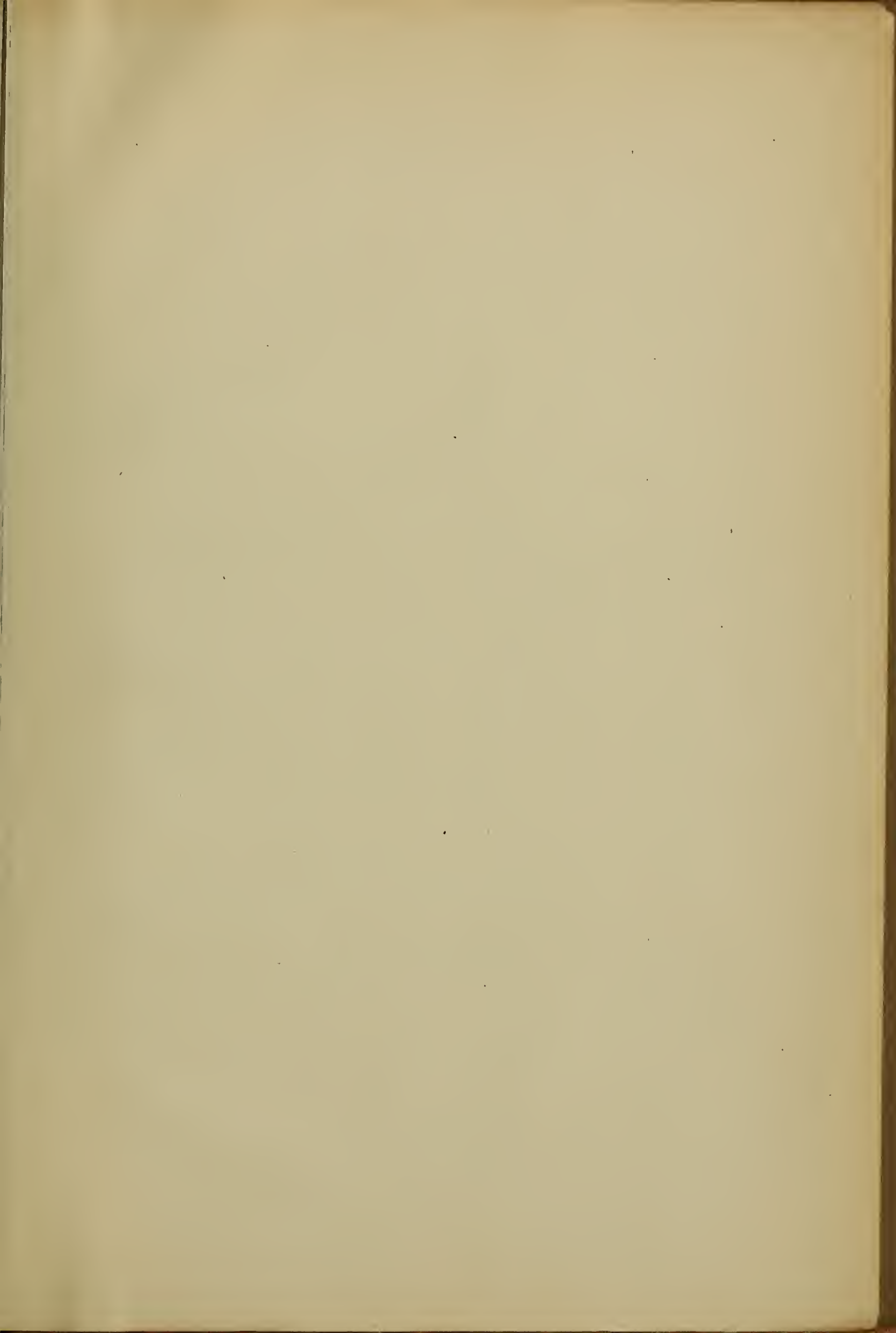
10. A tone purifier for talking machines comprising a purifying member pivotally supported by the vibration bar which vibrates the reproducing diaphragm, the said body being capable of a movement whereby it may be brought into or out of engagement with the diaphragm, substantially as described.

11. A tone purifier for talking machines, comprising a body movably supported by the vibration bar which vibrates the reproducing diaphragm, the said body being adapted to be moved into or out of engagement with the diaphragm, substantially as described.

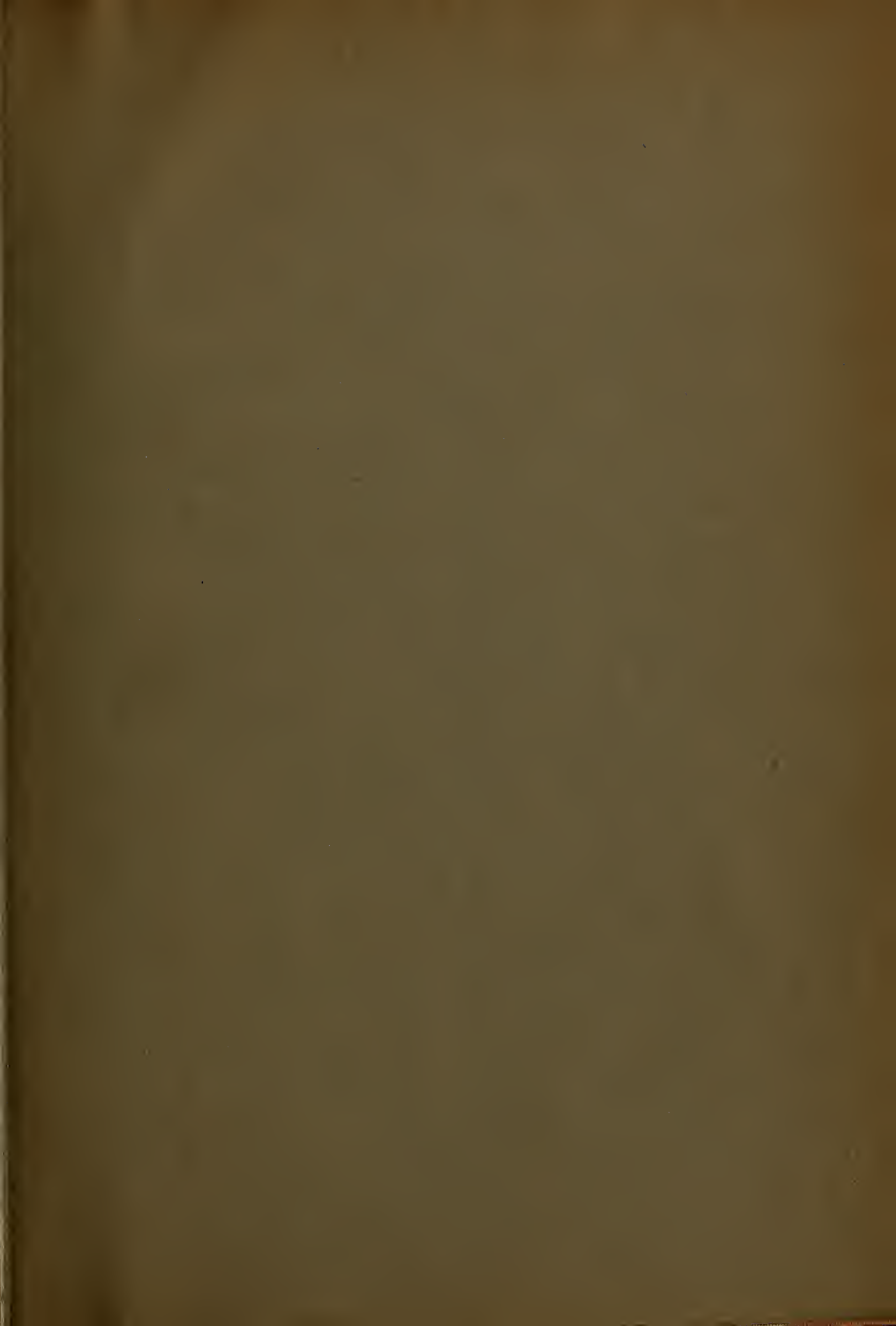
In testimony whereof I affix my signature.

CHARLES P. MARSHALL.

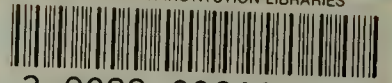
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